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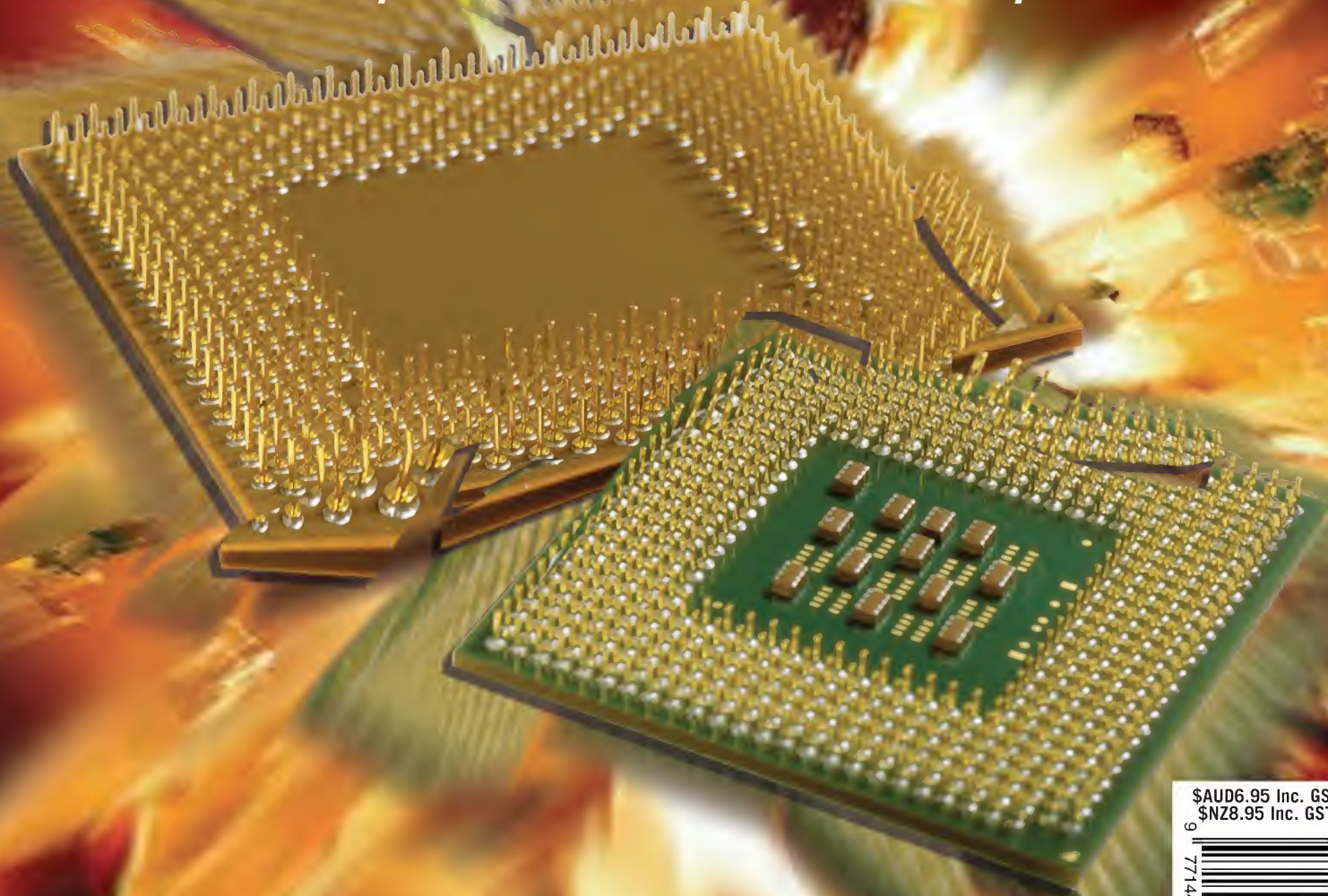
BIG GUN BATTLE CHIPS

Athlon XP 2800+ vs Pentium 4 3.06GHz

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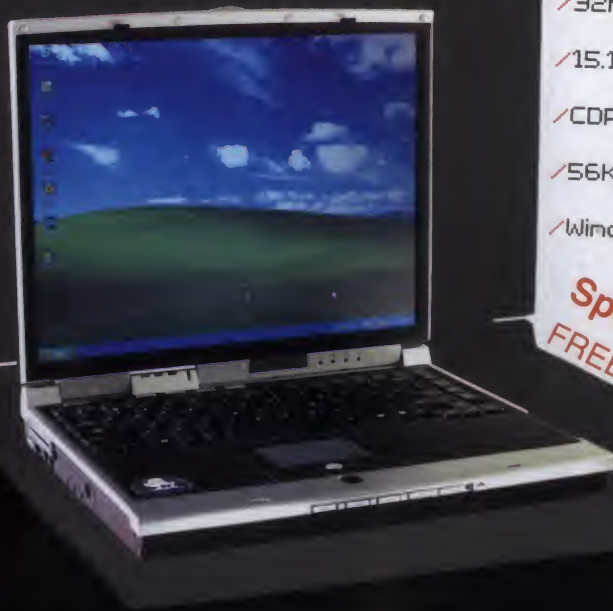
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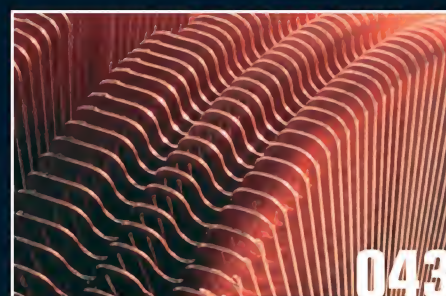
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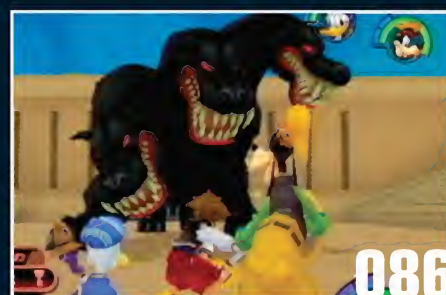
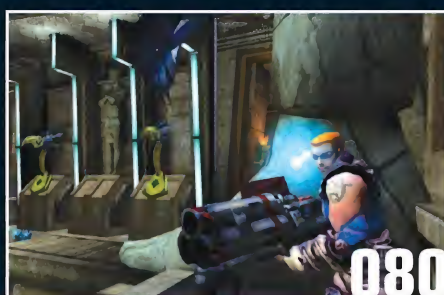
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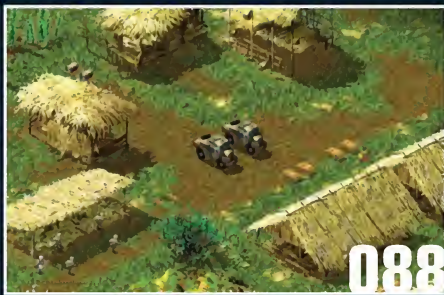
Superb prizes this month to give you some more Google practise. JNC MP3, Albatron Ti4200, crazy-arsed LCD and Cate Archer.

TUTORIAL: The Uber Linux box project Pt4

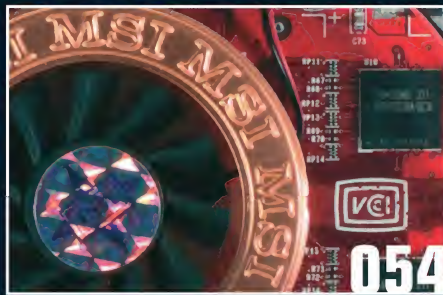
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In this thrilling conclusion we unveil little known Linux trickery and massage the most out of kernel compilation.





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Fun new temporarily half-sized letters to wile away the sunny sundays with.

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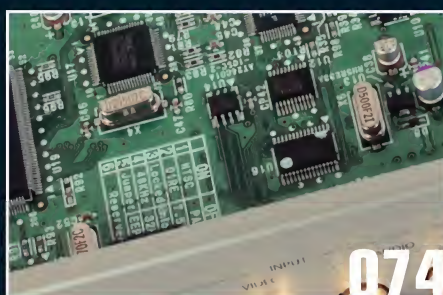
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Join Club *Atomic* and save save save. If you're lucky, which is based purely on your actions in your previous life, you could win a neat Altech pack, including a flat screen monitor, a 512 MB stick of muntz DDR-RAM and a glorious case to pack it all and show off to your friends.



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Cheap as fast chips

Right about now it's upgrade time for many Atomicians. This time of the year always sees a bump in hardware sales, fed by the summer being bountiful in new product releases, along with Xmas price wars. There's also an advertising-driven seasonal predisposition to spending up big in summer. Mostly though, I suspect, it's because we need a good and munny box to game on over the holidays.

On the front line right now for most effective upgrades are the old reliables: CPU and graphics cards. In our quest for CPU supremacy Bennett threw the Athlon XP 2800+ up against the Pentium 4 3.06GHz. We were all looking forward to seeing the test results, because these are the fastest CPUs around right now and AMD versus Intel battles are always fun. This was also a great chance to see how Intel's Hyper-Threading performed.

It wasn't a huge surprise to see the P4 come out on top, but the mere 10% edge the 3.06GHz P4 had over AMD's 2.25GHz chip made for great ammo for AMD fans, considering that the Athlon costs almost exactly half the price of the P4. AMD is keeping a steady pace with Intel for now, but it's highly unlikely the Thoroughbred-core Athlon will climb any higher than this 2800+ iteration, while the P4 still has oodles of headroom.

Early next year the Barton core will debut, probably at 3000+. AMD will recalibrate its QuantiSpeed formula to reflect Barton's extra cache and 333MHz bus speed, so we don't know how many actual GHz will pump through the new CPU. We're all impressed with the grunt AMD has squeezed out of the Athlon, and we can't wait to see what Hammer (also to be known as Athlon – which is a major bummer) can do.

Things will start to get really funky for Intel when it switches to the 0.9-micron Prescott P4, sometime in the second half of next year. Intel says that 5GHz is easily achievable with this core, and given that the P4 core's long pipelines were designed with 10GHz in mind, it's clear AMD won't be able to stick with 0.13 if it wants to stay in the race – or in business, ultimately.

On the video front, we all now worship the new god: ATI's RADEON 9700. The arrival of this powerpacking 3D heavyweight has had a pleasing effect on the market: NVIDIA's GeForce4-based boards have dropped in price, and NVIDIA has done away with the Ti4400 chipset entirely, claiming an over-segmented market. That's a good one, coming from the company that routinely has up to half-a-dozen variants of the same product on the market. In any case, the fallout has been a swag of cheap Ti4200s. Top performers, usually happily overclockable to close to Ti4600 speeds and priced as low as \$300. John chucked a bunch of 4200s against each other this month, being sure to test for overclocking, of course.

I know you're busy shopping for pressies for friends and relatives, but spare something for yourself – after all, who's number 1?

Speaking of pressies, we have a couple of Xmas goodies lined up especially for subscribers. That's not counting the low price, unchanged since we put the newsstand price up a buck. No, for *Atomic 23* we've scored a demo CD of the special European version of No One Lives Forever 2, thanks to Vivendi. Very sweet.

And, after much loud demand, we've printed up a few thousand *Atomic* stickers to give away. Oh yeah, you know you want them. Every *Atomic* subscriber will get a free *Atomic* sticker (there's actually two!) with *Atomic 25*. If you're not a subscriber, you have until around the first week of Jan 2003 to get in to be eligible. Your case isn't complete without *Atomic* stickage. Or your car.

Have a good month all.

Ben Mansill



EDITORIAL

Editor: Ben Mansill bmansill@atomicmpc.com.au

Staff Writer: Bennett Ring bring@atomicmpc.com.au

Staff Writer: John Gillooly jgillooly@atomicmpc.com.au

Online Writer: Brad Webb bwebb@atomicmpc.com.au

DESIGN

Designer: Kate Marsden kmarsden@atomicmpc.com.au

Product Photography: Michael Frey

CONTRIBUTORS

Logan Booker, Tim Dean, Ronald Marc, Des McNicholas, Ashton Mills, Lachlan Newman, Simon Peppercorn, Dan Rutter, John Simpson, Vaughan Smith, Stuart Torkington and Cindy the Barrel Girl

PRODUCTION

Production Manager: Angela McKinnon amckinnon@atomicmpc.com.au

Sub-Editor: Stuart Ridley sridley@atomicmpc.com.au

Junior Sub-Editor: Logan Booker lbooker@atomicmpc.com.au

Traffic Coordinator: Jamie Dickson jdickson@atomicmpc.com.au

Subscriptions: Eileen Chong echong@atomicmpc.com.au

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ADVERTISING

t + 61 2 8399 3346 f + 61 2 8399 3622

Strategic Accounts Head: Andy Jackson ajackson@atomicmpc.com.au

Senior Account Manager: Cathy Snell csnell@atomicmpc.com.au

Account Manager: Joveline Bascon jbascon@atomicmpc.com.au

AJB PUBLISHING

t + 61 2 8399 3611 f + 61 2 8399 3622

Unit 2-5/44-70 Rosehill Street, Redfern NSW 2016 Australia

Managing Director: Adrian Jenkins ajenkins@atomicmpc.com.au

General Manager: Simon Corbett scorbett@atomicmpc.com.au

SUBSCRIPTION ENQUIRIES

Aust – t 02 9879 4915 e subscriptions@atomicmpc.com.au

NZ – t 09 625 3005 e ricketts@gordongotch.co.nz

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Short Circuits

With the preliminary DDR II specification finally confirmed by JEDEC, video card giants NVIDIA and ATI could not be blamed for wanting to show off a card using the new RAM type. ATI has drawn its guns a little quicker than its competitor this time, supposedly demonstrating a 3D chipset using DDR II RAM.

According to an official ATI statement: 'DDR-2 is the technological foundation for the eagerly anticipated third-generation DRAM for graphics (GDDR3) due out next year, an industry-wide initiative led by ATI.' Obviously ATI is eager to be at the forefront of the 'third-generation' – and it's hard to argue otherwise as we continue to feel the absence of the NV30.

A rather interesting letter was sent to FCC (Federal Communications Commission) Chairman Michael Powell. The letter basically stated that when the telecommunications infrastructure (in America) fails, no attempts should be made to bring it back to life. This is in the hope that a better communications infrastructure will be born from the ruins; all sparked by the lack of broadband, and absence of any refreshing of obsolete services. The authors of the letter are people with significant involvement in the current system, and whose views are not easily dismissed. It's a shame we can't use such a strategy with Telstra.

Atomic power? Yes please! Researchers at Cornell University in New York have developed a battery that uses radioactivity to produced enough power to last around fifty years. It only outputs a few milliwatts of energy, so don't be looking to replace your notebook battery just yet. It emits beta radiation, the least energetic type of nuclear decay. Its initial use will be in implants.

Roll me up Scotty!

LANs are events of beauty, glory and all-out fun. Nothing quite comes close enough to top the excitement of fragging your friends and making them cry. If they're lucky enough, it will be their house, and Mum won't be too far away to comfort them.

Unfortunately for us, LANs also have a major downer: carting your monitor from your place to the LAN and back can be a hazardous affair, and you can bet your sweet cathode ray that many a CRT has perished from a cracked screen after slipping from the greasy fingers of a humble LAN guru. Sure, you have LCD, but they're still bulky, hard and most importantly, breakable.

Well, you can kiss your screen scarring days goodbye, as two British companies have joined forces to produce a new breed of display, the OLED, or organic light emitting diode screen.

Now, you've probably heard of this before, some time ago. Until now, the technology had no financial backing, and therefore no ability to begin development. Cambridge Display Technology (CDT) has purchased rival Opsys, and together will produce the roll-up displays.

The pair sell their technology to such companies as Seiko Epson and Philips, who themselves have opened up factories to start production of monochrome OLED displays for cellular phones and other portable devices.


CDT has so tough competition though, as Eastman Kodak is one of the original developers of the technology and will be looking to produce the new displays as well. OLED technology has the potential to be used for full-colour screens.

The primary reason this technology is likely to really take off in the market is because Opsys has produced superior polymers, called dendrimers. These polymers will be used in the construction of the displays, and will replace CDT's own light emitting polymers.

The newer materials produce brighter and more energy efficient results, however, the two companies hope to combine their technologies to increase the life of the dendrimer polymers.

So, why are OLED displays so immensely cool? Well, OLED displays will be many times thinner than current LCDs – thin enough to be rolled up. OLEDs do not require a backlight, and project light in only one direction.

We should expect this technology in the near future, sometime around 2005, and according to David Fyfe, Chief Executive of CDT, OLEDs should finally push CRTs out of the display arena.

So hang up your electron gun, and holster instead an organic LED, because next LAN, you'll be turning up with your tower in one hand, and a rolled-up screen in the other – and your mates will be gagging with envy. 

Chip your children

What is the deal with ID numbers? Sorry to 'Seinfeld-erise' that sentence, but it really is the only way to say it. Every now and then, someone or some company will blurt out a plan to chip or ID the population ala Syndicate Wars. And every time, that plan evaporates into the mists of Avalon.

Not this time though.

You *have* to be against this, unless you think that personal freedom and human rights are just buzz words used by the UN to help sanction its actions – which is true, but beside the point.


The FDA (Food and Drug Association) has given the go ahead to the VeriChip, a small device designed to be implanted into animals and humans. The range of the device is around four feet, so it won't be used as a tracking device but rather an information retrieval system. The chip will emit an ID on a frequency of 125KHz, and that ID will link to a database.

The database can contain a wealth of information and as such, is being pitched at families with children. Concerned parents can have their children 'chipped' so if something

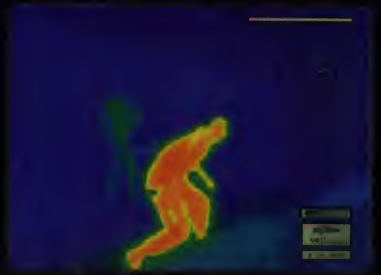
happens to them, their address, medical records, name and other information can be retrieve quickly and efficiently. There is nothing stopping third-parties from doing the same thing however, for marketing and advertising reasons, or for something entirely more sinister. That's fairly extreme though.

This is all happening in America, of course, and right now you can 'get chipped' by Applied Digital Solutions, the company responsible for the VeriChip. In fact, the first 100,000 people to undergo the procedure will get a \$50 discount. Wow. You're paying *them* to tag you. To top this wonderful new future, the FDA has no plans to regulate or monitor such a system if it is used for 'security, financial and personal identification or safety applications'.

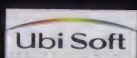
Eventually the chip will be designed to interface with a watch computer, so that the signal can be broadcast through conventional cellular networks. The chip will also be developed further so it can transmit more information, including location details and physical conditions.

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Short Circuits

◀ In a move undoubtedly brought about by the recent sniper killings in the US, a Wal-Mart in Washington D.C. has decided not to sell certain violent video games and hence some prominent titles been pulled from shelves. In total, seven games have been removed, including Terminator: Dawn of Fate, Rogue Spear and Rainbow Six. A resident near the store supporting the action, said "If the snipers didn't have violence in their life, I don't think they'd be as violent as they are". The store is alone in its withdrawal, as each shop can choose which products it sells.

◀ Back to video cards, one Website discovered that the ATI RADEON 9700 can't handle too much heavy action on particular motherboards, resulting in BSODs and 'device display failure' warnings from Windows. This is simply just another compatibility issue to add to the pile that has been growing of late – a pile where AGP 3.0 (8x) and DDR400 have found a comfortable home.

We can only hope that things start fixing themselves.

◀ Piracy seriously hurts the games industry, or, to put it in more of a real-world context: piracy creates an environment of formulaic, low risk games. Atomic is anti-piracy, but we aren't always as clear on this subject as we should be.

In Atomic 22 we ran a news story about the current state of Xbox mod chips in Australia.

We were not endorsing piracy. The intention of the news story was to convey the state of play with mod chips, specifically in regards to the ability to run open source operating systems on the Xbox hardware. We'll say it again here: piracy is bad. If you don't support your favourite platform or developer it might not be there for you in the future.

2GHz MP3 player

The C3 hasn't made any serious inroads into the CPU market – Intel and AMD simply offer faster alternatives. The heralded feature of the C3 CPU was its ability to function at full capacity with only passive cooling. This made it ideal for use in machines that didn't require too much grunt and needed to be quiet, and as such could be used as multimedia systems for playing MP3s and videos.

In order to keep up with the cracking pace in the CPU arena, VIA has revealed that it has developed a new CPU, which is currently codenamed 'Nehemiah'.

VIA plans to aim at the same market segment with the new processor, which is a completely new design, and will function as a replacement for the Ezra – the current C3 processor on the market. It will use the 0.13 micron manufacturing process, pack 20.5 million transistors, have SSE instruction and APIC support – all sitting on a 52 square millimetre die. The CPU is projected to scale from 1GHz to 1.5GHz, however, VIA are confident that it will be able to do 2GHz, with a bit of tweaking. It will include AIS, an as of yet unused set of x86 instructions that pass instructions down to the execution unit.

The voltage and clock multiplier will be controllable via software, and the CPU has a nifty feature dubbed 'software CPI throttling' that will handle how hard the CPU prefetches data. All this makes the Nehemiah a very attractive solution for notebook manufacturers, who will no doubt be interested in the power requirements of the new chip. In this regard, VIA have happily obliged, stating that the new chip will consume approximately 50 per cent less power than competing solutions.

The Nehemiah will function using the same bus and slot as the Ezra, and will therefore work in a standard Socket 370 motherboard. VIA has concluded from its own tests of the chip that it will have roughly 90 per cent the performance of a similarly clocked Celeron. We can assume that the comparison Celeron is a Coppermine Pentium III, rather than one of the new Pentium 4-based chips.

The chip is slated for a late 2003 release. Until this time, the current C3, the Ezra, will see a revision, dubbed Ezra-T, to make it compatible with the Tualatin bus, and will scale from 900MHz to 1.1GHz. ○

Atomican

Last month saw the inaugural Atomic vs. OCAU tournament, held at Matchrix in Sydney. After suffering a . . . *cough* defeat to OCAU at Counter-Strike, Team Atomic made a superb comeback in the Medal of Honour match for a close victory. The event was such a success, that it's time for another round. Further details can be found in the Community Forums

(www.atomicmpc.com.au/forum.asp?cat=cc&top=60111). Good luck Team Atomic against those T-shirt-wearing OCAU guys!

Atomicans everywhere are taking part in as many distributed projects as possible. One day an Atomican's overclocked CPU cycle will surely find a cure for cancer, or the existence of aliens (even though we know of the existence of our alien, Virtuoso, already). One great Atomican, Darrkon, puts together boxes purely for the purpose of working on SETI Units (setiathome.ssl.berkeley.edu). Qudos to Darrkon and everybody else for their work.

Channel Champ, Praetorian, has programmed the AtomicMPC bot to now be able to provide comprehensive channel stats. Now we can all find out who has the worse case of textural diarrhoea. www.ultracore.net:8033/atomicmpc is where you can find it all out.

I'd recommend that everybody has a read of Nicher's 'Descartes' thread

(www.atomicmpc.com.au/forum.asp?cat=ge&top=61002). While it may look a bit overwhelming at first, it contains some great discussion on modern philosophical thought. I'd put my money on this thread becoming the next J:JAM (Jesus: Just a Man?) thread. Well worth the effort to read.

Another great forum resource is azns_kickass's overclocking resources database (www.atomicmpc.com.au/forum.asp?cat=cc&top=60111). Azns and many other Atomicans have provided some great Web resources for getting the most out of your system. Top stuff guys.

I'd just like to recommend that everybody checks out the other sections of the forums. While the world may revolve around 'General', there are other sections which make up our fantastic forums and they contain an absolute wealth of information.

As always folks, try to remember that the ability to destroy a planet is insignificant, next to the power of the Force.

Wilkshake

WHAT'S HOT

- ATI – Gaining momentum
- HYPERBOLE – New tech must be good
- NFORCE2 – NVIDIA finally gets it right
- UT2003 – Next gen twitch gaming is here
- AGP 4X – The aperture for the masses

WHAT'S NOT

- NVIDIA – Crunch time for the reigning 3D king
- HYPERTHREADING – Faster AND slower
- NFORCE – First time unlucky
- QUAKE 3 – Now showing its age
- AGP 8X – Marketing overdrive

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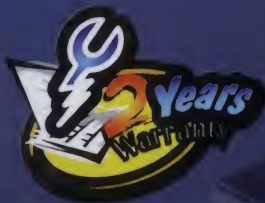
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Peer pressure

Linux is all about choice, says Ashton Mills, but when it comes to gaining prominence on the desktop, choice may not be a successful ingredient.



Linux has reached a turning point: the whole world now knows that Linux with its Unix heritage makes a powerful, efficient, stable and reasonably cheap server platform.

But in userland, where Microsoft made its fortune, Linux has barely made a dent. It may well make one in the future, but right now there are a number of hurdles to overcome.

The traditional bugbear of application support is well and truly non sequitur. . . Any application you use under Windows has at least one alternative under Linux. Sometimes the Linux alternative is better, sometimes it's not, but there's certainly no need for a Windows emulator anymore. Unless, that is, it

user would even try it unless it looks and feels like something they're already familiar with?

It comes down to usability. Linux has more usability than you can poke a penguin at, but is it the right kind? It's aesthetically sexy, it has nifty features, it interoperates well and it has this mostly unheard characteristic of being stable. But it's not standardised.

A successful desktop must be intuitive and consistent. It must not take three weeks to figure out, and it must be flexible enough and intelligent enough so that Stupid People™ can move the mouse and click buttons, and things happen as they expect. And it must work the same way all the time.

should on the KDE desktop, Gnome ones don't. Further, Gnome and KDE dialogs differ, so mixing desktop applications between the two only creates more confusion.

Still, given these environments have evolved out of the skills and free time of programmers around the world, they are remarkable achievements – but not enough to displace the Windows UI. Granted, this isn't necessarily the aim of the KDE and Gnome projects – they are made for Linux users, not Windows users – but with some modification they could at least be intuitive and consistent enough to make your average Windows user feel comfortable, because if they do, they'll stick around.

Red Hat attempted to do just this in its Red Hat 8 release by standardising the look and feel between both KDE and Gnome desktops with its Bluecurve theme and UI modifications. Not surprisingly, hardcore KDE and Gnome users saw this as an affront, but I commend Red Hat for its efforts. Red Hat knows that for Linux to succeed as a mass-market desktop it needs a common environment, it needs consistency. Of all the recent changes to the Linux desktop landscape recently, I think Red Hat's changes have been both the most controversial and the most beneficial. And hey, this is the power of Open Source – that you *can* change and improve, and build on what came before.

That's not to say KDE and Gnome won't succeed at doing this anyway: the upcoming developments in KDE 3 and Gnome 2 are enough to make you drool, but it may be a year yet before they bear the kind of fruit that Windows users like to eat.

And in the meantime Red Hat's controversial changes are pushing the envelope and bringing the importance of a complete, consistent desktop solution to the foreground.

Ultimately, it's just a matter of time before a Linux desktop fulfills all the requirements of usability to complement its functionality. And when that finally does happen, who would be seen dead using Windows?

'It comes down to usability. Linux has more usability than you can poke a penguin at, but is it the right kind?'

comes to games – but the release of the Linux client in the boxed UT2003 hopefully signals a changing perception towards Linux as a gaming platform.

But I digress. For geeks like you and I the Linux desktop has already made it. Its versatility and intelligent features are like gold, but only if you know how to use them. Pulling a figure out of my pants here, I'd say 90% of the world's computer users aren't geeks. They don't care that there are fifteen different desktops you can run or a hundred ways to configure them. They don't care if they're running Windows or Linux or Uber-OS, they just want to sit down and get on with their work. They want it to be intuitive and do what they tell it to do. The diversity and flexibility of the Linux GUI means nothing to them.

And why should it? Any business thinking of running Linux as a desktop would only do so because it appeals to the bottom line. But the costs of retraining, or any sort of desktop support, could counteract savings on the free OS unless it's easy enough to be used as a drop-in replacement for Windows. And what everyday home

Programs must properly understand where desktop boundaries are. 'OK' and 'Close' buttons must always be in the same place and file dialogs – no matter which program uses them – must look and act the same way. Help messages must actually be informative, and so on.

The Windows family is no usability king here, though it has improved (see The Interface Hall of Shame at www.iarchitect.com/mshame.htm for a revealing look), but it's still more aligned than the family of Linux interfaces.

Of the diverse desktop environments Linux sports, only KDE and Gnome come close to offering a standard. Both are quite consistent, but there are still gaps where applications and the interface don't behave as you expect. Moreover, the diversity of applications for both environments has seen a selection of programs where the tool for the job in one desktop is better than its equivalent in the other – such as using the Gnome Web browser Galeon on the KDE desktop. Currently most KDE and Gnome applications only know how to handle their own environment, so while KDE programs behave as they

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in motor accidents, food poisonings and drownings combined.



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A bus to Yellowstone

Rambus might not have gotten off to the best start, but what does it have in store for us down the track?



Rambus. The company everyone seems to love to hate. Remember Intel's great RDRAM putsch of '99? Ah jeez, did that go down poorly. The thing is, the technology itself was really never that bad, despite the reports from certain popular online hardware personalities, who shall remain nameless – except for the fact that one of their names starts with a 'T' and ends with 'homas Pabst'.

The problem was one of marketing and PR. In marketing terms, the technology was a touch premature in the sense that PCs didn't really need the extra bandwidth that RD-RAM could deliver over SDRAM, especially at the cost of latency. RDRAM also came at a price premium that simply didn't make sense given its performance.

'Yellowstone actually represents a number of new technologies that will ultimately combine and work together to build the next generation of system memory.'

The price was ultimately a bit of a vicious circle, that was further hampered by the Intel/Rambus relationship, and Rambus' licensing schemes. This meant that few RAM manufacturers had the confidence in the market to invest in the high cost of licensing and retooling to manufacture RDRAM – so the volumes weren't there, the price went up, the market didn't get into it, the RAM manufacturers lost confidence and so on and so on. Yossarian would be proud. In PR terms, Intel was not overly used to defending itself against such an onslaught of negative press about a technology that was supposed to be faster than the alternatives, and Rambus' bullish attitude to certainly didn't help.

But look at things now. RDRAM is still more expensive than DDR-RAM, but only by a bee's schlong, and dual channel RDRAM shows a clear performance advantage over DDR with the bandwidth-hungry Pentium 4. DDR's days are also numbered, as its capabilities are far more limited than that of serial memory technologies. Pin counts, PCB layers and transistor counts are all looking in favour of serial technologies – as we have seen

with Serial ATA and PCI Express – in terms of performance and cost in the long term. You might even remember one crazy columnist in this fine publication making some kind of hit prediction that AMD would adopt serial memory technology sometime before 2004. That guy was a real nut bar...

So, if serial memory technology is the way of the future, then what is its greatest proponent, Rambus, got in stall for us on the horizon? Well, you'll probably start hearing a lot more over the next several months about a little thing Rambus likes to call Yellowstone. Oooooe – that's a kickin' codename. The images it conjures up of mountain lakes, picnics and sasquatches really makes me think of bandwidth. Not.

Yellowstone actually represents a number of new technologies that will ultimately combine and work together to build the next generation of system memory. The goal is to meet the expected bandwidth demands of 6.4GB/sec that Rambus recons we'll need by 2005 (at the moment dual channel RDRAM delivers 3.2GB/sec).

The first technology is called DRSL, or Differential Rambus Signalling Levels. This is just a fancy acronym and funky name for reducing the signal swing down to 1.0V to 1.2V – with a differential of 0.2V, or 200mV. The voltage differential is the difference between the highest voltage signal sent down the wire (which could represent, say, '1'), and the lowest voltage signal (representing, say, '0'). Many other technologies use higher voltage differentials, such as 3.3V for LVTTTL (Low Voltage Transistor-Transistor Logic), as used in a lot of SDRAM these days, or 2.5V for Stub Series Terminated Logic. A lower voltage differential means lower power is needed, which also reduces heat, and there is less crosstalk. The difficulty is that you need far more sensitive receptors to pick up the small differential. That's the

trick of DRSL...

The second technology is ODR, or Octal Data Rate, which is just the 'oct', or 8x version of DDR. The difference between ODR and DDR is that DDR uses the one clock and just sends information on the rising and falling edges of the clock. Rambus' ODR sends only 8-bits per cycle, and actually uses a 4x clock multiplier to go from 400MHz to 1.6GHz, which then uses the rising and falling edge of that signal to send information. This also requires some seriously sensitive gear to work without futzing up the signal.

The final shenanigan is FlexPhase, which is actually a very interesting little development that may well find applications outside the memory space. FlexPhase is supposed to make it easier and cheaper to manufacture PCBs (printed circuit boards, like mobos).

The thing is, when you have two chips on a PCB with wires connecting them, you need to make some wires very wiggly and others straight so they all have the same length. This is so a signal sent over the wires on one clock strobe all arrives at the other chip at the same time. If the wires were different lengths, the signals would arrive at different times. FlexPhase, as the name suggests, allows signals over different wires to be sent out of phase, from 2ps (picoseconds) to 625ps, so it arrives at its destination at the right time. This means PCBs don't need such crazy-arse layouts, with wiggly traces running all over the shop, which in turn means lower cost to manufacture.

All these technologies culminate in Yellowstone, which could potentially double memory bandwidth over the next couple of years. It should also be less expensive to produce than parallel memory technologies, and will therefore hopefully avoid the malarky of the original RDRAM debacle. There's a way to go, and the sensitivity required to make these technologies work is still out of mass-production reach, although I did see some Yellowstone DRSL QDR demoed at the recent Fall Intel Developer Forum, and it did look funky.

Let's just hope Rambus picks the right time to deliver it to market – and the right price...

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- 5.1 Channel audio
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The \$10,000 RAM disk

Daniel Rutter doesn't want to wait a couple of milliseconds for his hard drive to do each seek operation – he wants the speed of RAM, in a disk.



Hard drives suck.

Oh, sure, they're several times faster and have *thousands* of times as much capacity as used to be normal, back in the days when most computers didn't have a hard drive at all.

And they're cheap, and pretty reliable, and highly compatible with each other, blah blah blah.

But they still suck.

A fast consumer hard drive these days can manage sustained transfer rates of about 50 and 30 megabytes per second, for read and write operations, respectively.

Seek operations – moving the head assembly to where it needs to be to get at some data – take several

benefit from tens of gigabytes of RAM – but can't necessarily accept it.

If a corporation really, *really* doesn't want to tear down its dinosaur pens and rewrite all of its software to run on a more modern architecture, but also really, *really* needs its vast database to stop crawling, then SSDs can solve the problem. If it costs \$US100,000, then that's a bargain.

What if someone started making SSDs for the consumer market, though? How cheap could they be?

Well, assuming you wanted a mere 20GB drive (20 real 1024-megabyte gigabytes, not 20 fake 1,000,000,000-byte hard drive manufacturers' gigabytes. . .), you'd be talking an easy

electronics could let the drive work from magnetic storage while it filled its multi-gigabyte 'cache', but do that and you say goodbye to your zooty five second system boot.

Anyway, for the components in the SSD besides the RAM, I doubt you'd get away for less than another \$1,000.

Add a conservative profit margin, and you have a 20GB drive that's really fast as long as you're not turning it on and off often, but which costs \$7,500 at the very least, and could quite easily be more than \$10,000. A mere \$10,000 for 20GB would be a price sensation by the standards of current large capacity SSDs.

As I write this, that bare-minimum \$7,500 will buy you about two and a half terabytes worth of 80GB 7200rpm commodity ATA drives. They're a lot slower, of course, but then they'll give you 125 times as much storage as a probably-unrealistically-cheap-SSD, which makes up for a lot.

If your operating system's virtual memory management isn't all that it might be, then putting your swap file in RAM one way or another – on a software-created RAM disk, or on an SSD – is a very good idea. The same goes for any other temporary files that you don't mind losing when you reboot the computer.

But if all you want is a gigabyte or two, you might as well just install a lot of system RAM and use that. It'll be faster, because RAM buses are way faster than hard drive buses. And it can't help but be much cheaper than any SSD option.

You can't physically install 20GB of RAM in a PC, of course. If you want to do a task that needs that much RAM, then you need a serious workstation or server, and probably not one with an Intel-compatible CPU. The sensible solution is to buy that beefier non-Intel box, not drop many kilobucks on an SSD for a PC.

In the future, as well as flying cars, we'll have solid-state permanent storage. Right now, though, there is still no sensible alternative to moving parts in PCs.

'Assuming you wanted a mere 20GB drive, you'd be talking an easy \$5,000 just for the memory assembly, probably more.'

milliseconds, at least. Compared with RAM, that's appallingly slow.

Even basic PC100 SDRAM can shift a few hundred real-world megabytes per second each way, and has access times – analogous to seek speed – well below 100 nanoseconds. One millisecond equals one *million* nanoseconds.

There exist things called Solid State Disks – SSDs. They're 'disk drives' with no moving parts; they store data in RAM. Run your PC from an SSD instead of a regular disk drive and any 'disk' operation will be blindingly fast.

Unfortunately, around \$US3 per megabyte is a good price for an SSD. That's well over \$5,000 Australian per gigabyte. Far more expensive than ordinary memory modules.

Why the heck do SSDs exist, then?

Well, mainly so that people can add large amounts of fast storage to architectures that can't accept any more main memory.

A few gigabytes of RAM will be adequate for practically every PC task, but minicomputers and other Medium-To-Big Iron often have to handle very large data sets. These computers can

\$5,000 just for the memory assembly, probably more. If you wanted to get the RAM chip count down to a mere 160 units, you'd need 1024-megabit chips, which ain't cheap.

So there's that.

And then there's the uninterruptible power supply (UPS), and the 20GB magnetic drive that you'd need to save the SSD's contents when it was powered down. And the hardware and firmware to activate the automatic RAM-to-disk backup if and when the drive loses power.

Writing the entire contents of your tiddly little 20GB SSD to the magnetic drive will probably take something like a quarter of an hour, but if the drive isn't full it'll be faster.

A clever constant-mirroring system could reduce the wait further by pre-writing whatever it could whenever there was a spare moment – at the price of wearing out the magnetic drive, of course.

Reading back the data on startup would be faster: a full 20GB drive could be ready to go in less than ten minutes. Again, clever backing

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Technical details

- VIA C3 800MHz @ 400MHz
- ASUS CUSI-M
- 8x CD-ROM
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- Fully-featured menu system
- Custom-made case
- Custom-made front panel
- Custom-made buttons

The story

The start of Year12 (HSC), and what do you know, I needed a Design and Technology major project. So I thought 'Why not build a standalone MP3 player?'. It has taken me the whole year, but was well worth it. MP3s can play off any Linux mountable network drive, HDD, internal CD-ROM or other device. The front panel was quite hard to manufacture, requiring a home-built CNC milling machine – the results

are professional. The whole case is made out of Aluminium and manufactured from scratch. The software is Embedded Linux MP3 Player (ELMP). ELMP is fully open source :) and written in C. The PC is dead quiet, only the PSU has a fan and the HDD switches off after one minute if not being used, ie. playing MP3s off a network. It wasn't meant to be anything powerful, just to be used for playing MP3s up in my bedroom. I am thinking of putting in a SB Live! 

data_mines' Carputer




Technical details

- ABIT BP6 w/Custom BIOS (to make it boot faster when using Windows XP's Hibernate state)
- Two 533MHz Intel Celeron (Mendocino core) @ 544MHz 2.0V
- 512MB Kingmax SDRAM
- 20GB HDD
- Pioneer DVD-116 16x DVD
- GF4 MX 420 @ 440 (passive heatsink)
- Sound Blaster Live!
- Intel PRO/100
- DWL-520+ 22Mb/s 802.11b
- 12.1in colour LCD panel

The story

I wanted to build the best in-car entertainment system ever seen. Firstly, not one but two processors; a large 12in colour LCD screen; DVD; TV/FM; MP3; DivX and most importantly – gaming! So I added a DVD-ROM drive; hard drive; TV/FM Tuner card with infrared remote; Geforce4 MX; 10/100 Ethernet and 22Mb/s wireless (war driving, cable free MP3 updates). Now for control. In conjunction with the IR remote control I used a program called Girder (www.girder.nl/) to

provide programmability to the remote, allowing me to use Windows Media Player, the TV and FM programs, and system functions like mute and screen on/off without needing a keyboard or mouse. I added a four-port USB hub to the back of the LCD screens' frame so with a simple plug-in action I have a full keyboard and mouse – ready for any Quake cravings. I'll have to remember to pull over first :). It'll also make a great LAN box – all that is needed is to swap the 12V DC power supply for a normal 240V AC version and I'll be good to go. 

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Aaron's ICE-CUBE



Technical details

- Gigabyte GA-71XE4
- Duron 600MHz
- GeForce2 MX 200
- 20GB HDD 7200RPM
- 256MB PC133RAM
- 3mm polished checker-plate
- Hex-key heads & lock nuts
- Sheet glass side
- Mirrors on case floor
- Custom IDE HDD cable
- Alert Safety warning stickers
- ATECH digital thermo
- Dodgy handles
- Atomic graf in lieu of sticker

The story

This is my first case mod. The idea was to make it look *Atomic*, like a portable nuclear bomb or a little nuclear reactor. I also wanted to really mod my case and not play with it – anyone can spray it with fluoro spray paint. So, like a race car, I removed everything that was slowing it down – the sides, front and top – to leave me with a bare chassis to modify. The checker-plate was purchased and cut at a metal

fabricators, and attached to the case with hex key nuts and nylon locking bolts (had to cut around the drive bays myself with a jigsaw). The drives are sprayed chrome; there is a bluey/purpley neon light; mirrors on the floors and ceilings to make it look like a dual processor system; a one-of-a-kind rounded metal IDE cable; an ATECH digital thermo from Jaycar that tells the ambient temperature in the case as well as the video chip's temperature.



Ultramodz' THE CUBE



Technical details

- Duron 800MHz
- MSI KT7 Pro 2 motherboard
- 384MB RAM
- Sony CD-RW drive
- LG CD-ROM drive
- 20GB Quantum hard drive
- Creative SoundBlaster Live! 5.1
- ASUS GeForce2 MX 400
- Internal modem
- Super blue LEDs
- Blue cathode
- Clear 350W power supply
- Rounded IDE cables
- 100% Perspex case

The story

I have wanted to get into case modding for some time now, but I wanted to have a go at something more complex than just a side window. When I spotted this grey Perspex, I knew it would be perfect for what I had in mind.

I wanted to create something that showed off everything inside, with a nice illusion of the components being suspended in a clear block of glowing Perspex.

After drawing up the case I began cutting, but with only a Stanley knife and a Dremel. It was hard going.

Several weeks and a few broken pieces of Perspex later, I had my case. I then added a blue cathode and super blue LEDs for the power and hard drive lights. My next step is to replace my faithful Duron, as it became a victim of a very tight clip on the HSF. It still turns on, but has become very temperamental when being pushed hard during heavy gaming sessions.



USB FireFly

Supplier: Anyware www.anyware.com.au

Phone: Anyware (03) 9763 8200

Price: \$24

This product is very similar to the other USB fan we've looked at in this Gearbox, except for the fact that this one pumps out cool light instead of cool air. Simply plug this lamp into a spare USB port, and your work area will be instantly transformed from being dank and dingy into an area filled with enough light to set up your own hydroponics lab. Well, it's not quite that bright, but at least you'll be able to see your immediate surroundings.

You might have noticed that this lamp doesn't have a base. Instead, the USB cord is constructed of rigid material that can be bent into shape, kind of like the tackles on show in 'Puppetry of the Penis'.

Unfortunately, if your PC is hidden under your desk, the USB lead won't be long enough to allow the lamp to reach your deskstop.



CoolPC memory temperature sensor/alarm

Supplier: CoolPC www.coolpc.com.au

Phone: CoolPC (07) 3879 2255

Price: \$28

So you've just lost your job and your partner has dumped you (taking the house, car and mutual bank account with them), leaving you penniless and suicidal.

And yet, the only thing you can think about is your need for a temperature monitor for your PC. Considering your circumstances, it's doubtful you could afford something as snazzy as the Lost In Space display to fulfil this role. Which is where this little gizmo comes in. At a mere \$28, you won't need to sell a kidney to pay for it. At this price you can't expect too much from this thing, but it will monitor a single heat source, and trigger an annoying beep if the sucker gets too hot – too hot being the temperature you specify. This thing isn't exactly flash, but it does the job.



Thermaltake fan grills

Supplier: Anyware www.anyware.com.au

Phone: Anyware (03) 9763 8200

Price: \$18 for two

A bleeding stump instead of a finger isn't a good thing, unless you happen to be a sadomasochist, in which case you're probably too busy letting your other half take a dump on your chest to be tinkering with a PC. If you're not one of these sickos, a fan grill will come in handy to help keep your hands digitally intact, especially when applied to the fans at the front of your case.

Thermaltake is renowned for being a company that cares about fingers, so it's no surprise that it has released its very own matching fan grill set. We think they're pretty damn ugly, but hey, so are we. Beauty is in the eye of the snake they say, so you just might disagree.



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Inspire
me.

AMD
me.

80mm Evercool Aluminium frame fanSupplier: PC Case Gear www.pccasegear.com

Phone: PC Case Gear (03) 9568 0932

Price: \$20

Fan, oh fan, spinning in the breeze. Fan, oh fan, helping me overclock with ease.

Fan, oh fan, why do you smell like cheese?

Are you sick of cheesy clear fans with more LEDs than a model Death Star?

Probably not, as they are still quite new to the modding scene, but if so, Aluminium fans are the next stage in the great evolution of the fan. Actually, only the frame of the fan is made of Aluminium, while the blades are coated in silver paint. For a case fan, these things actually look pretty darn sexy. Oh god, we need to get out more if we can think that a case fan looks sexy...

**Genuine Tweakmonster RAM sinks**Supplier: PC Case Gear www.pccasegear.com.au

Phone: PC Case Gear (03) 9568 0932

Price: \$30 for four

We've said it before, and we'll say it again – most video cards have decent cooling on them already, and temperatures don't really play much of a part when it comes to overclocking them anyway. But you just won't listen, will you? There are always going to be those of you who want to add custom cooling to every piece of hardware for your PC, including the mouse and monitor, and it's at dill pickles like this that these RAM sinks are aimed. Available in both TSOP and BGA sizes (why you'd need it on cooler BGA RAM is beyond us), even if these things don't do a whole lot, at least they look sweet. And who knows, you might just be able to squeeze an extra 3MHz out of your memory with these all copper beauties. Hurrah!

**Kensington USB FlyFan**Supplier: Anyware www.anyware.com.au

Phone: Anyware (03) 9763 8200

Price: \$25

It's getting hot in here, so take off all your clothes. Or you could just plug in one of these USB fans. It seems that USB gadgets are all the rage, and this is yet another in the massive lineup. Just looking at it, you could easily be persuaded into thinking that it is really a Barmix, but thanks to very floppy blades, this fan won't be cutting anything stronger than cotton candy. If you're one of those unfortunate peasants who doesn't have airconditioning, this will be a handy little fan that takes up zero desk space, thanks to its flexible neck.

Like the USB lamp, this gadget is no good if your PC is housed underneath your desk space, as it simply won't reach that far.

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Deus Ex 2: Invisible War



WHY WE CARE: A true genius of game design pushes his boundaries even further.

DEVELOPER: Ion Storm www.ionstorm.com

PUBLISHER: Eidos www.eidos.com

PLATFORM: PC / Xbox **DATE:** Q1, 2003

Deus Ex was like a bolt from the blue when it arrived a couple of years ago. Stridently refusing to be classified, the game blended FPS action with RPG character development and, as a bonus, threw in elements like stealth and puzzle solving.

Deus Ex was truly capable of being a chameleon: it was full of character development options and ways you could play the game, with the power to change its colour depending on the needs of the player. If you wanted to go in and shoot all and sundry this was difficult, but possible.

Given that you could take so many more creative approaches to solving the challenges the game threw your way, then you were really short changing yourself if you played it as if it was a conventional shoot em up.

The sequel, Deus Ex 2: Invisible War, is brimming with similar levels of promise and has a much more refined 3D engine, so this time around the graphics will also equal the greatness of the gameplay.

The action takes place around two decades after the original game, and one of the first things you discover is that the hero from the first episode, JC Denton, has gone missing.

Naturally you are given the task of tracking him down.

Your organisation, UNATCO, has commissioned four agents – three men and a woman – which you will be given control of to try and locate Denton. Each agent will have its own unique abilities and you will also be given access to new augmentation options so that you can develop the biotech skills that suit your approach best.

Invisible War is a more complex game than the original: your enemies won't be as clearly defined, and having been through the wars that followed JC Denton's adventures in the first game, the world is a much darker place, with many factions emerging. In Invisible War there will be many shades of grey.

Right or wrong isn't as clear this time around, and the factional alliances you are forced to choose will determine the course of the game, with no particular choice being easily interpreted as either completely right or wrong.

As you would expect, Deus Ex 2 will also pursue a labyrinthine approach to narrative, with many paths leading to one of five endings.

Many of the renowned characters from the original game will return for an encore, and it is likely that the popular Tracer Tong from Hong Kong will play a far greater role.

Non-violent problem solving approaches are something of a priority for the team, which has investigated more social ways of overcoming obstacles at the urging of studio head Warren Spector.

This edict should lead to even more open ended and interesting gameplay, as well as perhaps a more involved conversation system, and you will be given many more moral choices to make. AI has also been given more weight in development, with characters relying less on scripting and more on reacting directly to events as they happen. Those you meet will assess your actions by taking into account their individual moral code and memory of recent events.

Be careful what you do in Deus Ex 2 as your reputation will precede you!

A physics engine far superior to that used in the original game will also back up the more thorough approach to the AI.

In its pursuit of more interactive – and hence believable – environments, Ion Storm has licensed the 'Havok' middleware system, which takes care of collision detection as well as real time shadow and lighting effects.

Spector wants Deus Ex 2 to be a more interactive world with more than just a few switches being open to physical manipulation by the player.

Furniture in the demo – and bizarrely even potted plants – can be moved about and used to provide cover or simply as a distraction so you can set an ambush.

The game's lighting system comes into its own when doing this too, as you can use the shadows to conceal yourself or, conversely, use intense light to blind adversaries.

It's quite impressive just how well you blend into the darkness in a small room with a single light bulb, and even better how you are revealed to all when the light is sent swinging on its cord by a few well placed gunshots.

Motion capture and a new facial animation system will also make their debut in Deus Ex 2, with realistic facial animations and lip-synched audio being the objective.

These elements will make the characters come to life and should lead to a story with a much more compelling cast.

Invisible War is looking like being better than the original game – if that is at all possible.

While holding short of Warren-worship, knowing Warren Spector and his team are involved this would have to be on the cards.

Command and Conquer: Generals



WHY WE CARE: The next game in the C&C universe takes a leap forward.

DEVELOPER: Electronic Arts www.ea.com

PUBLISHER: Electronic Arts www.ea.com

PLATFORM: Xbox and PC **DATE:** Q1, 2003

If you're interested in real time strategy games then no series has had as much of an impact on the genre as the Command and Conquer games. Having been quite successful with the latest Red Alert game, publisher EA has asked its Irvine development studios to change its direction slightly, taking what has worked in the previous Command and Conquer games and establishing a new milieu. It will incorporate a more sophisticated game system and a full 3D graphics solution.

The resulting game, Command and Conquer: Generals, looks like it will be a confident step forward.

Mark Skaggs, the producer in charge of the game is very excited about where Generals is going. In particular, he is very happy with the three armies which take part in the conflict, stating, 'There are three sides and the first is the US, which packs lethal hi-tech hardware. The second side is China, it likes massive armies inspired by propaganda and fire-based weapons that do huge amounts of destruction. The third side is the sneaky low-tech guys from the Global Liberation Army.'

C&C: Generals contains twenty-seven missions in story mode, where the player becomes involved with all three sides in one continuous story. The action is looking to be very involved with huge bombers flying overhead, massive missiles launching and hordes of tanks and other troops.

Best of all, the game is not based on any of the previous C&C efforts and so the artificial intelligence scripting is much more sophisticated. This is a welcome development as the previous C&C games are now antiquated in terms of the AI.

In another first, the game will also ship with a fully functional editor that will allow you to easily design your own missions in

the Command and Conquer gameworld.

This is a significant change of direction for the series and is a great initiative that should see a host of user-created games springing up online shortly after Generals is released, prolonging the life of the game.

The three sides you get to play will have vastly different approaches to warfare. The US will rely on high tech equipment, very strong tanks, paratroops and airpower. This includes the devastating fuel-to-air bomb that clears whole areas.

The Chinese units take the word firepower literally with a variety of incendiary devices forming the mainstay of their army. This is reinforced by the inclusion of Flamethrower tanks. Also, thanks to advanced Chinese field medicine, the army's troops will have the ability to heal quickly in battle. This makes it a powerful, if slow, opponent to play against.

The final group, the fictitious GLA, will use weapons based on stealth and biotechnology. It'll also have the ability to dig their forces in using underground tunnels. The GLA doesn't have the sledgehammer power of the Chinese, or the precise devastation that typifies the US, but it can hit fast and melt into the surrounding area. The GLA will also be able to scavenge the battlefield for wrecks from the expensive US and Chinese forces and use this booty to fund more firepower.

Command and Conquer: Generals has a real sense of Hollywood-style action about it: during our preview we witnessed many huge explosions and some great looking story elements, which played out well during the battles we saw.

The interface and new unit types also looked very interesting and it would be hard to imagine the game not being a hit when it is released in January 2003.

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Rise of Nations



WHY WE CARE: 'Border pushing' will become a new RTS multiplayer phenomenon!

DEVELOPER: Big Huge Games www.bighugegames.com

PUBLISHER: Microsoft www.microsoft.com

PLATFORM: PC **DATE:** Q2, 2003

If you were to select two of the most influential and downright invidiously time-sapping games ever to see the light of the day you'd struggle to go past *Civilisation* and *Age of Empires*. Now imagine some evil contrived plan to bring the best bits of both games together for a new game that plays in real time, but with the deeper strategic elements many Civ fans would appreciate?

You'd better cherish your free time as *Rise Of Nations* is on its way. The game is being developed by start up Big Huge Games, and it seeks to fuse elements of games like *Civilization*, *Empire Earth* and *Age of Empires*. Bryan Reynolds, who has worked on *Civilisation* and *Alpha Centuri*, heads up Big Huge Games, so the team has a reasonable pedigree already, even if the company is new.

In *Rise of Nations* you'll still have to watch over your workers performing basic tasks typical of the Age series, such as collecting wood and building farms, and the mining element feels mightily reminiscent of the Age series as well.

That said, the economic model has a few notable tweaks as well, with *Civilization*-inspired caravans giving you an income when you establish trade routes.

The preview build of the game had six playable races (Russian, Chinese, French, Egyptian, Aztec and Japanese), but the final release will include another dozen races for you to play with.

Similar in concept to the massive tech tree in *Age of Empires*, the version featured in *Rise of Nations* has many different epochs (or should that be 'ages'?) for you to progress through. You begin with the most meagre of technologies from ancient times and with time (and skill) develop to the point where

you can use nuclear weapons. Along the way you'll encounter a huge variety of units to build and fiddle with, and naturally these will also include unique units for each of the civilisations you select.

While it all looks and plays in a way which is scarily similar to *Age of Empires*, *Rise Of Nations* does have a few new tricks up its sleeve. It's helped by the fact that this is the first game using the AOE system with modern weapons such as tanks and mechanised infantry, and in multiplayer games especially you'll discover some fresh ideas that will make for great gaming.

The best new idea in the game revolves around 'border pushing'. Remember how consummately satisfying it was to win in *Civilisation III* by pushing your borders forward into enemy territory? This idea has been taken on board with *Rise of Nations*, and it was mighty good fun when we played a pre-release build of the code.

To successfully push back your opponent's borders you must fight to gain control of outposts, villages and other buildings, and then once you have positioned your troops in the area it becomes yours.

Your border will adjust accordingly to take in all that you have gained control of, so that juicy resource locations such as mines can contribute to your empire instead of that of your enemy.

This adds a promising strategic element to the game as you focus your attacks on regions that are going to have the most significant effect on the enemy's economy, or areas that are going to yield a big resource boon for you.

Border pushing in real time is tension-inducing stuff, as you can see the


enemy's sphere of influence growing and are thus compelled to try and restore your borders when under attack. This makes the game more about territory than simply going out there and killing off the enemy's resource gathering units – and *Rise of Nations* is all that much the better for it.

It also changes the way you fight battles: instead of destroying the enemy's town centre (or metropolis, later in the game) you damage it to the point where the citizens of the enemy town capitulate. You then gain control of the town, and, once you have repaired the captured centre to the point where it is back to full 'health', all of the surrounding buildings as well.

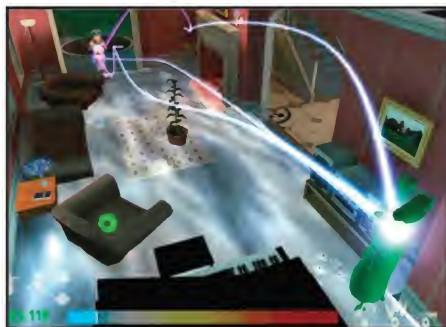
This interregnum before you can assume control also serves as a great opportunity for the enemy to attack you and force your troops away from the area. If this is successful then the enemy regains the town and you will be forced to counter-attack.

When playing the game both in multiplayer mode and against the computer this 'border pushing' approach to invasion really made for exciting battles as we tried to really concentrate our attacks and overwhelm the localised defences around the enemy towns.

The game uses technology that limits play to overhead isometric play, and the units aren't 3D polygon-based creations. Instead they're the more low-tech bitmaps featured in the first two Age games, though the levels of detail and animation have been stepped up a little, with some decent looking explosions and animations for the mechanised units in the game.

While it is sometime before it will be released, *Rise Of Nations* felt close to complete. The code was solid and well worth mucking about with – looks like a good omen to us, as long as the complete game is different enough to the other titles in the Age canon. 

Ghost Master



WHY WE CARE: Controlling an army of spectral vandals sounds good to us!

DEVELOPER: Sick Puppies www.empireinteractive.com

PUBLISHER: Empire www.empireinteractive.com

PLATFORM: PC + PS2 **DATE:** N/A

It has been a while since we've seen a spook-based strategy game. Not since classics such as *Polterguy: The Haunting* and *Ghostbusters* have we been given the task of mastering the spirit world in a videogame.

However, an expatriate Australian in the UK is leading a team that is currently working on a game with frighteningly imaginative ideas.

Ghost Master is an unusual looking title that is shaping up nicely. The game involves you taking the role of a spectral overlord in command of a group of spooks, apparitions, poltergeists and other ghostly creatures.

You will be given the task of occupying a number of areas and scaring the human occupants witless.

Some missions will be more complex than the predictable 'scare 'em away and giggle insanely' affair. Sometimes you will have to scare evil people away, while guiding others to view a specific object.

The more advanced missions will include goals such as helping people uncover evidence to bring murderers and thieves to justice or leading deserving relatives to hidden treasure. Assisting lost souls over to 'the other side' is also on the menu in addition to being a method of recruiting new spectres to aid your crew.

However, it won't all be plain sailing as those pesky humans will make it hard for you by hiring paranormal investigators. Expect some silly *Ghost Busters*-style gadgets and some comical human adversaries. *Ghost Master* will not take itself seriously and the developer, a company called Sick Puppies, has hinted that the game will be densely populated by horror movie

cross-references and spoof elements.

There are to be around sixty different spooks for you to control and scare people with, each offering different abilities and weaknesses.

Such spooks include gremlins that are brilliant at causing havoc by controlling and animating machinery and ghosts that specialise in materialisations by making blood run down the walls or slime ooze from under doors and other crevices.

There will be other spooks that use bloodcurdling sound effects or temperature changes, and finally: where would a haunted house be without poltergeists tossing books, furniture and all sorts of stuff around the place?

The graphics will have a cartoon-inspired edge and the game will feature stubborn humans that will try to ignore you and your army of apparitions' best attempts to scare them stupid.

Ghost Master will feature a wide range of impressive spectral effects (if you'll pardon the pun) and many visual touches that have been borrowed from classic horror movies.

You will even be able to see the world from the first person viewpoint of your human victims as they run about the place, scared witless.

Looking at things from the humans' viewpoint will also help you to understand what scenarios, characters and actions scare them most effectively.

Ghost Master should certainly rattle a few senses when it is released in the next couple of months.

In the meantime, you'll have to dig up those old *Creep Show* videos, turn off the lights and lock yourself in for the night.

Follow a Legend



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Impossible Creatures



WHY WE CARE: Freaks, freaks and more freaks!

DEVELOPER: Relic Entertainment www.relic.com

PUBLISHER: Microsoft www.microsoft.com

PLATFORM: PC **DATE:** Q4, 2002

Impossible Creatures is an interesting looking game: it seeks to combine real time resource management, made popular by games like Command and Conquer, with more advanced elements including a genetic creature creation system that lets you build armies of land, sea and air creatures who can then proceed to fight against your enemies.

In the game you are marooned on a cluster of islands and have to try and defeat a mad doctor-type called Upton Julius, who is breeding armies of genetic mutants with which he plans to terrorise the world. You uncover Julius' plan, appropriate one of his generator systems to create an army of your own and then go into battle.

The pre-release version of the game we played was very easy to get into, and we found the fact that our armies were weird hybrid animals made for some very interesting, strange and very often amusing combinations.

One hybrid we chose combined the head of an electric eel with the body of a giraffe to create a fast tall animal that can spit electrically charged water. Another creature combination might give land animals, such as lions and tigers, basic amphibious assault capability by bolting a shark's tail on them. Ugly, but effective.

The creature designer offers an easy-to-work-with strap-on system, which allows you to attach body parts to seven different torso points – kind of like pin the tail on the donkey, except with many more bizarre and potentially devastating possibilities.

Resource management comes into play, as you have to mine coal and use thermal vents and lightning rods to generate electricity to power your creature creating machines. These resources often serve as

focal points for conflict as you try and keep your machinery running by ensuring it is powered up, and because your workers have to be protected as they gather coal.

Your worker units are a bit comic as they are basically defenceless and can get torn to shreds, but if you're really desperate they can be sent to fight. For some peculiar reason they all have a thick Bronx accent – apparently something the guys from Relic Entertainment put in as a joke and decided to leave in the game as the 'smart Alec' worker guys are good value for a bit of light relief.

The economic model may sound like traditional resource management strategy stuff, but Impossible Creatures aims to keep you on your toes by throwing varied environments at you. It will also aim to throw you off-guard as you have to constantly change your army elements in response to new and different enemies.

The game will have at least three climate types: desert, tropical rainforest and snow – unsurprisingly, different creatures will be better adapted to each of these zones. You will also have to defend against flying, swimming and burrowing enemies, and each will require different types of units and strategies to most effectively deal with them.

Swimmers will be most easily managed if attacked by creatures that can meet them on their own terms in the waters that surround each island. Similarly, fliers are best taken on using fighter-style airborne attackers, or ground units with a good anti-air missile capability. So there shouldn't be any tedious 'tank rush'-style stuff in Impossible Creatures as most successful assaults will be carried out using a variety of creature types to cover all contingencies.

The studio head at Relic Entertainment, Alex Garden, is excited about how the game will build in complexity as you come across new creatures to create and throw into the mix: 'I like the way you will begin the game with pre-configured armies, and as you progress you get a new creature which gives you access to a new combination, which then leads you to creatively stack your forces with units,' he says, 'These have unique specific abilities and this makes for immense tactical variety in the game.' This creature creation capability is the essence of Impossible Creatures – and having played with the code for several hours, we found it works well. You come across more ecosystems during gameplay, and as you absorb them they become another part of your arsenal. The game will play in 3D and the interface is really easy to get the hang of. However, Garden is keen to make his game accessible to the masses in another way, by giving them a comprehensive set of development tools which they can then use to turn the basic game into just about anything they like. This approach has worked well with games like Quake, and Garden would like to see Impossible Creatures also become a popular platform for people who want to use the technology to make their own games, just for fun.

To this end he adds, 'We have this thing called the Relic Developer Network, and we have established an initiative which will see the industry push into new directions. A lot of the cool innovations you have seen of late have come from the fan community, not from the developers. We want to give people the opportunity to add to that, get recognition and into the industry.'

Impossible Creatures might just achieve the goals of being a decent game and a springboard for would-be developers to cut their teeth.

If you want to get a good start in the games biz this might be a good way to whet your appetite.

Planetside



WHY WE CARE: It is the next logical step for Tribes players.

DEVELOPER: Verant Interactive www.verant.com

PUBLISHER: Sony www.sonyonline.com

PLATFORM: PC **DATE:** Q1, 2003

Planetside is currently being developed by the guys at Verant Interactive, a company that is hoping to make the next evolutionary step in the development of multiplayer online action games. If you've played the excellent Tribes 2 from the now sadly defunct Dynamix, then Planetside might be the next logical step forward as the two games have several similar concepts. However, Verant Interactive plans to add a whole smorgasbord of new elements to Planetside.

The game is both a 3D shooter and a persistent story at the same time.

In essence, the game will let you enjoy all of the frenetic action of a 3D shooter like Quake, however there will be a point to the combat, as it will be a part of a wider ongoing conflict that you become involved in and revisit every time you log on.

Planetside will be set in a predictably clichéd post apocalyptic world, however this is the only aspect of the game design that is perhaps a little uninspired. The game will see you join the fray by choosing your allegiance to one of the major corporations in the world of Planetside.

This is where things will get interesting, as the ongoing conflict between the corporations in the game will be played out on the battlefield. You will have to go on many a mission, where your objectives can range from destroying enemy facilities to stealing enemy technology or overrunning an enemy fortification.

Success in Planetside is rewarded well, as characters will gain 'vocation points' that they can use to buy special skills, or to increase their ability to use special weapons or armour. Although this itself gives you great flexibility in the role you play, you will also be able to reallocate your points and change profession at any time.

There will be plenty of room for you to establish a unique personality for your online avatar. Player characters will wear the colours of the particular corporation they are affiliated with. It will also be possible to customise clothing, the most impressive aspect of this being the ability to import a scanned image of your face into the game. This way there will be no mistaking who is who when you meet someone online.

The game will feature corporate home cities, where you can't be harmed if you are allied to that particular corporation. There will also be trading posts, and you will start the game with a small apartment, which you will be able to upgrade as you are more successful in your endeavours.

By the looks of things, Planetside will have plenty of scope for role playing-style character development, complex missions and political intrigue. However the game will be first and foremost a 3D shooter, so you can expect lots of combat. Combat means death and the game will deal with this in a very interesting way: as each corporation has access to special technologies that make it impossible for you to die permanently, you will be 'respawned' after being killed. However, your rebirth will be away from the conflict you are fighting, and so your loss will have an impact on the battle at hand, as your allies will no longer be able to count on your support. This is the way battles will be won and it certainly sounds interesting.

There will also be an economic system, room for corporate alliances and territorial disputes. It is expected that up to 3,000 people will be able to play in a world at the same time, so Planetside looks like being an incredible epic all-in action game when it arrives early 2003.

Unleash the wrath of the Gods



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AGP 3.0

AGP has undergone a speed-doubling refresh, but does it make any real difference?

John Gillooly looks at how AGP operates and the impact it has on your system.

The PC technology retirement home is badly in need of a new wing. Over the next year it will be filling up with several new occupants: Parallel ATA, PCI and AGP being the most high profile. AGP is the shortest lived of these technologies, and is due for replacement by PCI-Express sometime late next year.

In the interim Intel has released the new AGP 3.0 spec, but if you haven't heard about it that's because chipset and motherboard manufacturers have decided AGP 8x is a sexier name, and use 8x in product names with the wild abandon showed with the XP moniker last year. AGP 3.0 is only a short-term fix to system needs, and most of the enhancements will benefit professional 3D users rather than us gamers.

As development of 3D graphics picked up speed over the past years there has been a concurrent need to increase the effectiveness and bandwidth of the interface between graphics hardware and the memory subsystem of the PC. This has led to swags of different buses over the years, all providing an incremental bandwidth increase. The first graphics-specific bus was developed by the Video Electronics Standards Association (VESA), and was dubbed the VESA Local Bus, or VLB for short. This provided increased bandwidth over the ISA (Industry Standard Architecture) bus, increasing it from 16MB/s to either 100MB/s or 132MB/s. This variable speed was caused by the bus speed being tied to the frontside bus, which ran at either 25MHz or 33MHz when VLB was in full flight. Unfortunately this tying of the VLB to the FSB made for quirky graphics card behaviour and VLB was somewhat short-lived.

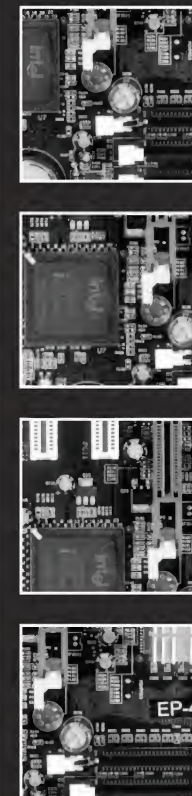
After this, the default graphics interface became the PCI bus, which shares 132MB/s between all the devices connected. This too became problematic as increasingly powerful and memory hungry

graphics cards flooded the bus when trying to access the CPU and memory subsystems.

In response to this Intel spearheaded development of the Accelerated Graphics Port (AGP). This was a new interface, similar in some ways to PCI, but designed especially for graphics cards. Rather than hooking into the Southbridge of the motherboard chipset like PCI, AGP hooks into the Northbridge and has direct access to system memory via a Graphics Address Remapping Table (GART), which dynamically allocates system memory to AGP on an as-needed basis.

By creating a dedicated pipe for the graphics card, issues with flooding the PCI bus are minimised (or some may argue, now left to the soundcard manufacturers). A secondary benefit is that the AGP bus can run at a higher frequency than PCI – 66MHz as opposed to 33MHz – and can implement some funky tricks such as strobing and sideband addressing to maximise the data transport over the AGP bus. Strobing involves skewing clock signals to increase the amount of data that can be sent and received over the 32-bit wide bus.

With AGP 8x, data is sent eight times during one clock cycle. It is this increase

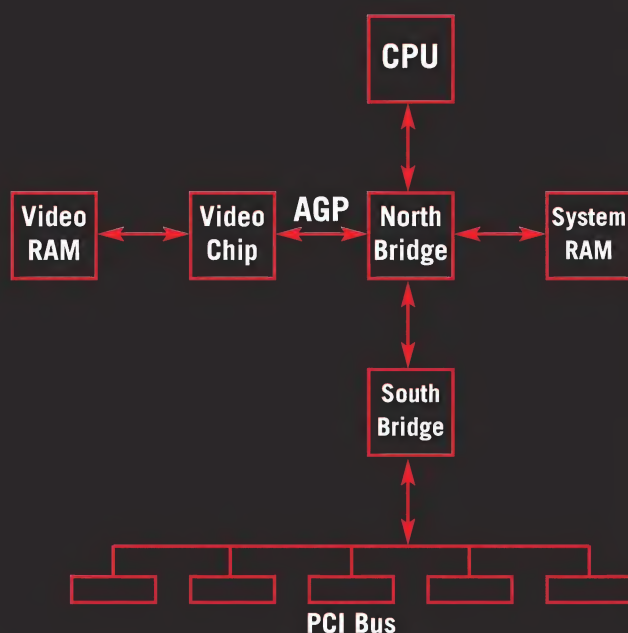


that leads to the higher theoretical bandwidth (2.1GB/s) of the new specification, however the majority of consumer 3D hardware and games still do not place any stress on the 1.1GB/s bandwidth delivered by AGP 4x.

Besides the speed increase, AGP 3.0 also adds a few new features, and retires some previously used ones. Gone is pipelining, a technique that was lauded when AGP first launched, that refers to the sequence in which data is sent through the AGP. However, support for isochronous data transfers has been added, albeit as an option for chipset designers. Isochronous transport refers to data streams that have guaranteed timing, and is something that is essential for time critical data like streaming media. Expect to see isochronous transport heavily pimped by NVIDIA when it talks about its nForce2 motherboard chipset and AGP 8x graphics cards.

AGP 3.0 is being introduced to the marketplace. VIA has AGP 8x support in its P4X400 and KT400 chipsets; NVIDIA has support as part of the nForce2; SiS includes support as part of the SiS648 chipset for the P4; and Intel is debuting AGP 8x in the low level server and workstation chipset, codenamed Granite Bay. One interesting future implementation of AGP will be in chipsets designed for AMD's Hammer processors: as AMD has incorporated the memory controller onboard the CPU, Hammer chipsets will require specific AGP controller chips.

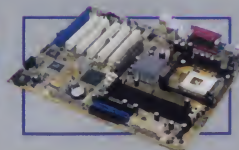
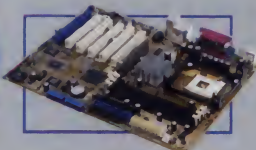
A curious fact about AGP 3.0 is that the AGP speed is no longer selectable in the BIOS. The new standard is autoswitching between



ABOVE: The AGP bus connects to the Northbridge of mobo chipsets

Satisfying Your Need For Speed

The P4PE socket 478 motherboard, the world's first solution able to support the next-generation P4 CPU up to 3GHz and beyond and Intel's latest Hyper-Threading technology. With the Intel 845PE chipset to deliver DDR333 memory and P4 CPUs on 533MHz FSB, the P4PE is a high-speed solution for the most demanding tasks. Combined with unique features such as C.P.R. and CrashFree BIOS, overclocking and system upgrade have never been easier.



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2x AGP 4x AGP 8x AGP

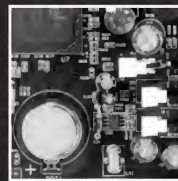
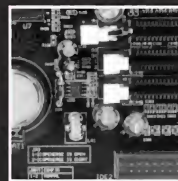
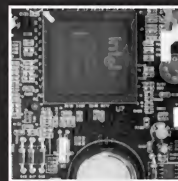
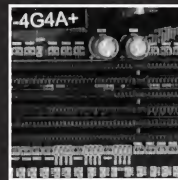
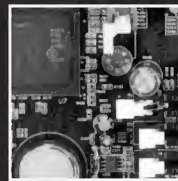
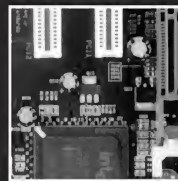
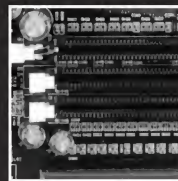
AGP 8x and AGP 4x modes for cards that support the AGP 3.0 standard. Motherboard manufacturers have the option of including support for both AGP 2.0 and AGP 3.0 cards on their boards. If a card uses the AGP 2.0 standard, you will still be able to control AGP speed in the BIOS, with the option magically disappearing when you insert an AGP 3.0 card. You can, however, still control AGP speed via third party applications such as Powerstrip.

It's all about width

AGP transfers become important when the memory requirements of the video card outweigh the amount of physical memory on the card. In all but a few extreme situations, the 64MB of RAM on most cards is more than sufficient. Cards with 128MB of video RAM generally use this for memory intensive performance enhancements like antialiasing or anisotropic filtering, rather than pure texture storage.

However, when we use a benchmark such as Codecreatures – the only gaming benchmark we use that requires 128MB of memory – we see the effects of the AGP aperture. On a 64MB video card Codecreatures uses 64MB of system RAM shared out over the AGP port, whereas on a 128MB it only uses the RAM on the video card.

We used Codecreatures to run some tests at different AGP speeds. Using two identically clocked GeForce4 Ti4200 cards, one with 128MB of memory and one with 64MB, we were able to see the effect of AGP speed on performance. On the 128MB card all the work is done within the video RAM and hence AGP speed does not become a



bottleneck, with the only difference between the 2x and 4x AGP benchmarks attributable to natural variation. However, the 64MB card shows a significant performance hit across the board as it accesses system memory via AGP. At AGP 4x it is 37% slower than the 128MB card, and this drops to 55% slower at AGP 2x. We also tested the AGP 8x compatible RADEON 9700 Pro using AGP 8x on a VIA KT400 motherboard. As the benchmark doesn't need to access system RAM, scores are identical between AGP 8x and AGP 4x. Unfortunately, we couldn't test the variability between 64MB and 128MB cards at AGP 8x, as there is no AGP 8x video chipset that supports 64MB and 128MB memory configurations.

Codecreatures is still an extreme example of video RAM usage, and the vast majority of games will not require AGP transfers on cards that have 64MB or more of RAM. There are some exceptions: Unreal Tournament 2003, for example, has a texture setting that is hidden on some cards for 'ultra high detail'. This has been hidden because it can require up to 180MB of video RAM to run, which means accessing system RAM via AGP and the annoying slowdowns that come with it.

AGP's advantages lie beyond the sharing of system RAM. Even with a touted 2.1GB/s, AGP 8x still proves to be a major bottleneck when compared to the high speed RAM and highly refined memory controllers used in current video cards. The benefits are more to do with taking the data hungry video hardware off the PCI bus and onto a separate pipe to the chipset. Increased bandwidth of AGP has also facilitated the introduction of technologies such as hardware transform and lighting – past testing has shown hardware T&L slows PCI video cards to a crawl.

The movement to PCI-Express for video hardware will provide a shift in the way our video hardware interfaces with our system. Rather than the 2.1GB/s offered by AGP 8x, sixteen lane PCI-Express connections will begin offering 2.5GB/s. This technology is then designed to scale over the next ten years to keep giving us more bandwidth.

As the amount of memory on video cards increases and the shift to 256-bit memory buses continues, the need to share system RAM is becoming irrelevant and inconvenient.

AGP makes a difference in only a few situations, and cards like the RADEON 9700 Pro work perfectly in boards compliant with the 4x AGP 2.0 specification, anyway. AGP 3.0 is only a minor step in the progress towards PCI-Express, and by no means an essential part of the computing experience. □

TECHNOLOGY	BUS SPEED	BUS WIDTH	BANDWIDTH
8-bit ISA	5MHz	8-bit	5MB/s
16-bit ISA	8MHz	16-bit	16MB/s
VESA LB	25MHz & 33MHz	32-bit	100MB/s or 32MB/s
PCI	33MHz	32-bit	132MB/s (shared)
AGP 1x	66MHz	32-bit	266MB/s
AGP 2x	66MHz	32-bit	533MB/s
AGP 4x	66MHz	32-bit	1066MB/s
AGP 8x	66MHz	32-bit	2133MB/s



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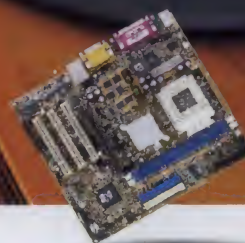
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VIA P4M266 Chipset
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PC133 SDRAM
AGP 4X & AC'97 Audio
6 USB & 2 PCI
Onboard LAN



AK32L

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VIA KT266 Chipset
2 * DIMM Slots for DDR 266/200 &
PC133 SDRAM
AGP 4X & AC'97 Audio
6 USB & 5 PCI



MK32N

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VIA MK266 Chipset
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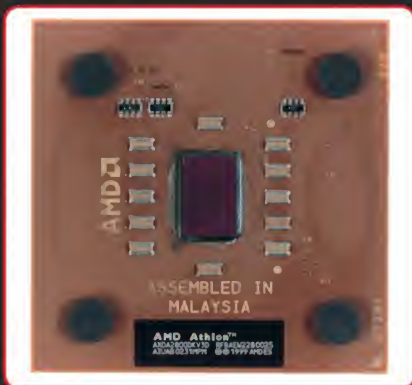
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DO BELIEVE THE HYPE(R)-THREADING

It must be getting close to Xmas. Why else would Bennett Ring have two shiny new CPUs to play with? Can AMD's Athlon keep up with Intel's Hyper-Threaded 3GHz+ beast?

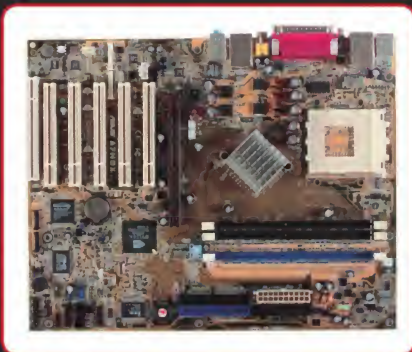
Read on. . .



ABOVE: The new Athlon XP 2800+ Thoroughbred-B, in all its glory.



ABOVE: It might say Intel confidential, but it's actually the 3.06GHz P4 in disguise.



ABOVE: Bringing dual-channel DDR to the masses is the nForce2 chipset.



ABOVE: The Intel 850E reference board, with a surprising amount of unused PCB space.

It's hard to believe that it's been three years since AMD took the world by storm with the Athlon CPU, a chip that finally outperformed anything manufactured by the Chipzilla of the processor world, Intel.

It has taken a while for Intel to regain the performance crown with its Pentium 4 processor, but the triple whammy of an increase in cache, core frequency and frontside bus speed has at last taken the Pentium 4 all the way to the top of the performance pile, albeit not by the hugest of margins.

Just when you thought Intel couldn't pull any more aces out of its silk-lined sleeves to increase the performance of the Pentium 4 without using simple frequency increases, along comes a new technique to wring even more performance out of the P4 architecture: Hyper-Threading. But do you think AMD are just going to sit back while Intel slaps them across the face with a sloppy wet trout? Of course not, which is why the Athlon has also just been blessed with a feature that should help it keep up with the P4 - an increase in the frontside bus speed, from 133MHz to 166MHz.

As the introduction of Hyper-Threading is a whole lot more interesting, not to mention revolutionary, than a simple frontside bus speed increase, this article's main focus will be on how Hyper-Threading works, and more importantly, whether or not you're going to notice any benefit from this new technology. Finally, we'll be taking a look at the performance of AMD and Intel's fastest CPUs to see if the balance of power has shifted from the side of the Pentium 4.

Hyper history

Research into Hyper-Threading was carried out for a lengthy six years before the release of the P4, so it's not as if this technology was an overnight conclusion. You might be surprised to discover that every P4 sold since its original launch already incorporates Hyper-Threading technology, but this has not been enabled until now, with the release of the 3.06GHz P4. Why did Intel bother to include Hyper-Threading in the P4's architecture if it was going to leave it disabled for two years? It turns out that Intel did not foresee a decent performance increase from the use of the Hyper-Threading technique until software had been optimised to take advantage of it. Indeed, for this very reason Intel did not plan to enable Hyper-Threading within the P4 until next year, to give software developers a chance to rejig their code to work well with it. However, it turns out that much of today's software already sees a significant performance increase with Hyper-Threading enabled even without optimisation, hence Intel's decision to activate the Hyper-Threading components within the P4 today. According to Intel, some of today's applications will notice an impressive increase in performance of up to 25%, so it's not surprising that it's finally awoken the Hyper-Threading components from their two-year hibernation. So just how does Hyper-Threading work?

How the hype works

In a nutshell, Hyper-Threading tricks software into believing that it is being run on two logical processors. A logical processor is a 'virtual' processor, whereas the CPUs we have come to know and love are physical processors. This does not mean that Intel has combined the components for two separate processors onto one physical processor - to do so would increase the die size by up to 100%, even if it were at all possible. This would lead to a doubling in manufacturing costs for each CPU. Hyper-Threading, on the other hand, only raises the P4's die size by a meager 5%. When compared to more brute force approaches used to raise CPU performance, such as the doubling of the cache on the Northwood model of the P4, which raised the die size by approximately 30%, with a resulting performance increase of approximately 10%, we see that

‘After all, Intel has clearly shown over the last couple of years that it doesn’t give a damn about backward compatibility, unlike AMD who has managed to stick to the same Socket A platform.’

Hyper-Threading is a very elegant and low cost method of increasing performance. The lower the increase in die size, the lower the increase in production costs, making a 5% die size increase for a 25% performance increase a very attractive method of boosting CPU performance.

Waste not, want not

A standard CPU is comprised of many different components that enable it to process a wide variety of instruction types. However, only during extremely rare circumstances are a majority of these components all being used at once. In fact, on average only 30% of a processor’s resources are being used during normal operation. This leaves a massive 70% of the processor twiddling its thumbs, day dreaming about snogging Sarah Michelle Gellar while it waits for something to do. Not exactly an efficient use of resources, is it? And as CPU frequencies continue to increase, more of the CPU’s resources are left unused, making this waste of resources an even bigger problem. Which is where Hyper-Threading comes in...

Instead of allowing these unused resources to remain idle, Hyper-Threading tries to make use of them, with a much higher overall usage of CPU resources as an end result. This is most apparent when trying to run two separate applications that tax different areas of the CPU, such as a floating point intensive application and an integer intensive application.

Because of this, Hyper-Threading can make a massive difference when it comes to multi-tasking. However, if you try to multitask with an application that uses a high amount of the CPU’s overall resources, the improvements aren’t anywhere near as significant, and the overall performance can actually decrease under these circumstances. Thankfully for Intel, applications that chew up the majority of a CPU’s resources are few and far between.

Even when running only one application, Hyper-Threading can deliver up to 25% better performance, according to Intel at least. This is where the 5% increase in die size comes

in, which is comprised of certain heavily used components of the CPU that have been duplicated, enabling multi-threaded programs to make use of the two logical processors. These duplicated CPU components are:

1. Instruction Streaming Buffers;
2. Next Instruction Pointer;
3. Instruction TLB;
4. Return Stack Predictor;
5. Trace Cache Next IP;
6. Trace Cache Fill Buffers; and
7. Register Alias Tables.

By duplicating these areas of the CPU, the Hyper-Threaded P4 can now execute multiple threads (operations or instructions) at once. Of course, for this to work, the application must also support multithreading. A couple of prime examples of multithreaded applications are Photoshop and Lightwave, both of which were designed with multithreading to take advantage of SMP (symmetric multiprocessing) systems. Because of this, a good rule of thumb to use to predict whether or not an application will notice a performance boost is this: if the application runs faster on a multiprocessor system, chances are it will also run faster on a Hyper-Threaded processor.

This is not always the case though. At the preliminary demo Intel gave us of the 3.06GHz in action, one of the demonstration guys admitted that there are a couple of applications he knew of that suffered from a performance hit of around 20%.

Unfortunately he wouldn’t tell us what these applications were, even after we threatened to force him to Sumo wrestle John in the nude. Mr Demo went on to say that these issues should be fully rectified with a little patch goodness. We noticed one issue when we enabled Hyper-Threading on our 3.06GHz testbench, specifically with Bapco SYSmark2002. Put simply, it would not run without crashing like a MiG at an air show. However, as soon as we disabled Hyper-Threading the benchmark completed without a problem. We expect this to be fixed in an upcoming patch.

What you will need

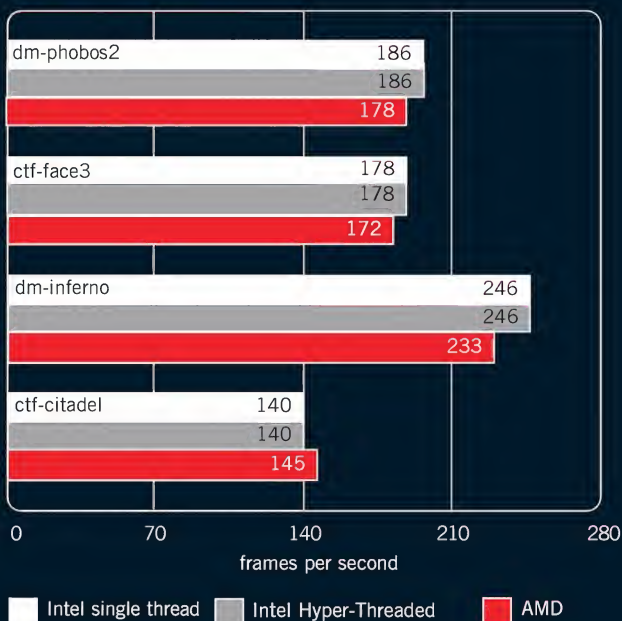
To use Hyper-Threading, you’re going to need a bit more than a Hyper-Threading enabled Pentium 4. Is that any surprise? After all, Intel has clearly shown over the last couple of years that it doesn’t give a damn about backward compatibility, unlike AMD who has managed to stick to the same Socket A platform. To run a Hyper-Threading enabled CPU you’re going to need the following:

1. A Hyper-Threading enabled Pentium 4 processor (duh!);
2. An Intel chipset that supports Hyper-Threading (i845PE, i845GE, i845GV, i850E and some instances of the i845E);
3. A system BIOS that supports Hyper-Threading; and
4. An operating system that supports Hyper-Threading (WinXP Home, WinXP Pro, or Linux kernel 2.4.18 or higher).

As you can see, upgrading to a Hyper-Threading Pentium 4 based system isn’t going to be a simple case of plugging your new 3.06GHz P4 into your old mobo with Win98.

A new old Athlon

Just like the Athlon XP 2400+ (2GHz) and 2600+ (2.13GHz) CPUs that were paper launched a couple of months ago, the Athlon XP 2800+ (2.25GHz) is based on the new 0.13-micron Thoroughbred-B core. This version of the Thoroughbred core has moved from eight metal layers up to nine, which is usually necessary when adding additional transistors to a CPU core. However, this extra layer is not being used for extra transistors, rather it’s there to help increase the frequency of the Athlon by allowing for extra room between the electrical paths within the CPU, which can limit frequency if packed too closely together. Unfortunately adding another metal layer increases manufacturing costs, so AMD is likely to make even less money from Thoroughbred-B CPUs than their predecessors. The transistor count has increased slightly by 400,000, but these aren’t used to aid performance; instead these additional transistors are used to implement decoupling capacitors, helping to reduce EMI caused by the higher chip frequency. ▶

Serious Sam SE: Co-op demo, CPU settings**Multitasking test (Q3A + Easy CD-DA)****Lightwave (raytrace scene, default settings)****UT2003 flyby demos**

Other than these tweaks, the major change to the Athlon XP 2800+ is a move to a 166MHz (effectively 333MHz) frontside bus, from its original speed of 133MHz. This is a simple alteration to the CPU that improves performance while keeping the CPU frequency stationary. However, just because the CPU is being fed data 25% faster does not mean that the CPU operates 25% faster. Some applications that rely heavily on memory bandwidth might notice a significant performance increase, but for most applications this increase is likely to be much lower.

Ready to rumble

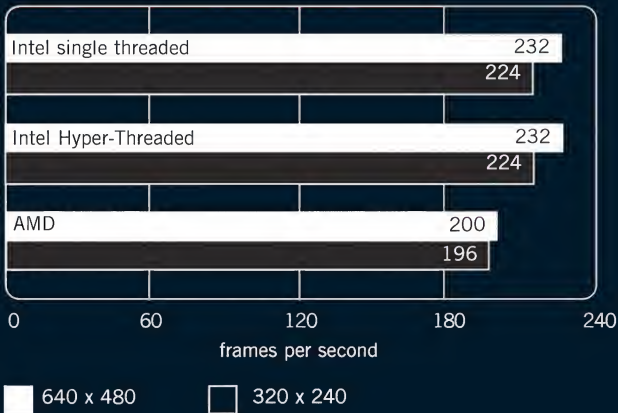
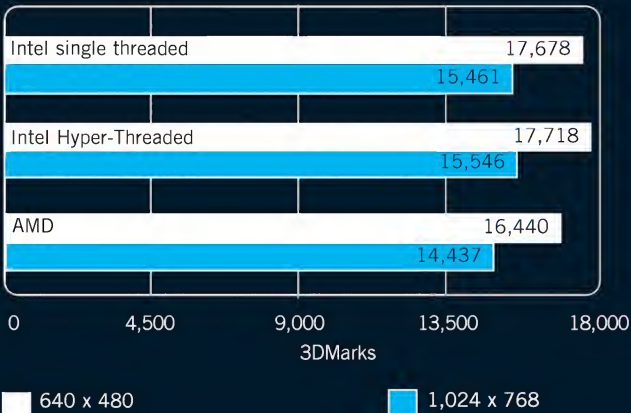
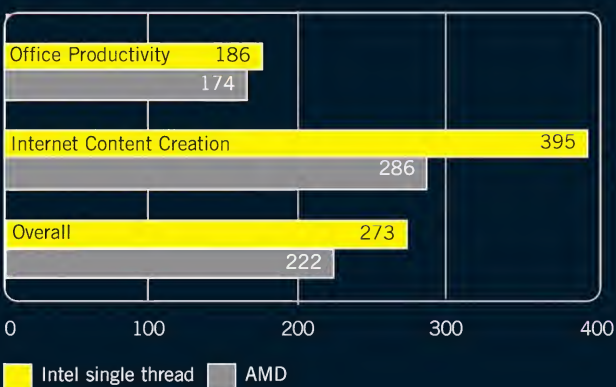
When testing CPUs you're not just testing the processor, as it's impossible to isolate it from the influence of the motherboard chipset and the memory speeds. This means you're really looking at the CPU, memory and chipset performance as a whole. This Head-to-Head pitted the fastest processors from both Intel and AMD against each other, so it was only natural that we combined these zippy chips with the fastest chipset and memory combination supported by each. In the case of Intel, we used an i850E-based Intel motherboard paired up with 512MB of PC1066 RD-RAM. On the AMD front was the nForce2 chipset, used in an ASUS A7N-8X motherboard with 512MB of Corsair XMS3200 DDR-RAM, was the obvious choice. To our dismay we had to set the memory on the AMD platform to its most conservative timing, due to system instability at higher speeds. But at least the nForce2 board gave us the option to do so, as the Intel board had a grand total of zero memory timing settings. An ATI RADEON 9700 PRO was used on both boards to limit video card bottlenecking, as was a Maxtor ATA-100, 7,200rpm hard drive. A fresh install of Windows XP Professional finished off the test setup. We would have liked to have tested the overclocking potential of both of these CPUs, but a lack of overclocking options (such as incremental frontside bus speeds or the ability to adjust the CPU Vcore) in both of the test motherboards prohibited us from doing so.

Let the benchmarks begin

The first benchmark run was Bapco's SYSmark2002. There is a lot of controversy surrounding this benchmark at the moment, with 2002 supposedly being heavily biased to the P4. As we've come to expect from SYSmark2002, the Pentium 4 had a sizeable lead, scoring approximately 22% faster in the overall score. The Internet Content Creation part of this test showed the biggest lead to the Intel camp, with the P4 having a 38% lead. However, it must be remembered that this part of the test is the most contentious area of SYSmark2002, so take these results with a grain of salt.

Now we have the yawn inducing Office productivity benchmark out of the way, let's get to the fun stuff: game benchmarks! You might try to pretend that you really need a 3GHz CPU so you can run your Excel spreadsheets a tad faster, but we know that you really want it so you can kick some major booty in UT2003 deathmatches. The first game benchmark to be run was the venerable Serious Sam SE: Co-Op demo, run at 320 x 240, 16-bit everything and low detail, to ensure that the video card was not a bottleneck. Once again the P4 came out on top, but only by a slight margin of 6%. As you can see, Hyper-Threading made absolutely no difference to the result in this benchmark – a trend that continued through all of the gaming benchmarks.

Next up was the Quake 3: Arena *AtomicMPC* demo benchmark, again run using CPU settings to limit bottlenecking in the video subsystem. We expected this memory bandwidth intensive benchmark to shine on the P4's RD-RAM, and we were right, with the P4 having a lead of approximately 16%. Strangely enough, on both platforms we measured a higher score at 640 x 480 resolution than at 320 x 240.

Q3A: AtomicMPC demo, CPU settings**3DMark2001 SE****BAPCo SYSmark2002**

The new UT2003 benchmarks were the next to hit these Uber CPUs, and for these we had to tweak the .ini file that the game uses. This is because the game automatically configures its detail settings depending on the components it's being run on, so our manual .ini file made sure that the detail settings for both platforms were identical.

We did not run the botmatches as these benchmarks change every time they are run, sticking instead to the constant flyby benchmarks.

As the results show, both of these CPUs are very closely matched when it comes to UT2003 performance, with each CPU taking victory

in two of the four benchmarks run. If we didn't run 3DMark2001 SE, you would probably assume that the Atomic team had been replaced by mutant alien clones, so that was the next benchmark to receive the AMD/Intel treatment.

Yet again the P4 took the lead, and yet again it wasn't by a huge amount, coming in at approximately 8% faster.

The next few tests were run to highlight the benefits of Hyper-Threading, and the results were very convincing. The first of these tests focused on multitasking performance. To do this we ran our standard Q3A AtomicMPC demo using CPU settings at the same time as ripping a CD using the Easy CD-DA MP3 ripping application. The frame rates in the Q3A test were the yardstick to measure the multitasking performance. As you can see from the results, Hyper-Threading resulted in a 69% performance increase over the P4 with Hyper-Threading disabled. Impressive to say the least – that is, if you happen to like ripping MP3s while gaming.

Unfortunately we can't envisage many serious gamers allowing any of their system resources to be used for other tasks while gaming. We tried to run several other multitasking tests, however the results for these were very inconsistent. It must be said that the Hyper-Threaded P4 was definitely more useable at the Windows desktop when processor intensive applications were being run, such as rendering during Lightwave. Speaking of Lightwave, this was the final test to be run due to its ability to be run in both single and multithreaded modes. Surprisingly the Athlon came out on top – something we didn't expect due to rendering's hunger for memory bandwidth. It's interesting to note that by enabling multithreading within Lightwave, the P4 increased its rendering performance by approximately 14%. However, even with multithreading, the P4 was still only equal to the Athlon.

And the winner is...

As the benchmarks show, for many of the tests the Pentium 4 is slightly faster than the Athlon, but usually not by a margin much greater than 10%. However, there were a couple of examples where the Athlon was able to keep up with the P4, and even exceed it. So now we know how these platforms perform, it's time to look at the ever-important cost of the components. On the Intel side, expect to pay approximately \$1,200 for the CPU, plus another \$600 for 512MB of PC1066 RD-RAM, coming to a rather hefty total of \$1,800. AMD, renowned for offering a much better price/performance ratio, came in significantly cheaper, at around \$600 for the CPU, with another \$300 for 512MB of PC2700 DDR-RAM, combining to a total of around \$900. So the slightly slower AMD system comes in at a massive 50% cheaper than the Intel system. It must be noted that these prices are approximate, based on the current prices of the top CPUs for both Intel and AMD, as pricing for the new chips was not available at the time of writing. When it comes to sheer performance, the new 3.06GHz Pentium 4 is hard to beat. The innovative Hyper-Threading feature can lead to tangible benefits when multitasking and running multithreaded applications, however, for the majority of home users it's not likely that these scenarios are going to be commonplace. The new 333MHz frontside bus of the Athlon XP 2800+ has helped it keep within spitting distance of the P4, and its much lower overall price means that it offers unrivalled value for money. So if you're a Mister Moneybags kind of guy, go ahead and blow almost \$2K on the Intel platform, safe in the knowledge that you have the fastest desktop processor currently available. But for the rest of us, the Athlon XP 2800+ reinforces AMD's legacy of providing a high performance platform that doesn't cost an arm and a leg.

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FrankenForce5

Now that the Ti4400 has been dropped by NVIDIA and the RADEON 9700 is the new high-end god of video, the Ti4200 is now almost as cheap as the MX and far more appealing to overclockers. Pack your bags with John Gillooly and prepare to explore the weird and wonderful edges of the GeForce4 world with five beastly budget 3D monsters.

As we sit back and bask in the glow of healthy competition in the video card market, we can see that different chip manufacturers have different strengths. For the time being ATI owns the expensive, high performance market with the RADEON 9700 PRO, and at the same time making a strong showing at the budget end with the RADEON 9000 PRO, and ready to make a splash in the middle with the RADEON 9500. But sitting in the middle is the true success story of the past year: NVIDIA's GeForce4 Ti4200.

This chip was a latecomer to the GeForce4 line-up, announced at the same time as the rest of the GeForce4 Ti range, but delayed for fears it would harm the sales of both GeForce4 Ti and MX-based cards. And this it did. As the market stands, the mid-to-high end GeForce4 Ti4400 chip has been discontinued and the GeForce4 MX has not made the

reference designs, to keep everyone happy and the playing field level.

One of the major differentiations between the Ti4200, Ti4400 and Ti4600 is price. To keep costs down, NVIDIA decided to forgo the full-sized PCB and BGA RAM packaging seen on the high end cards, and the Ti4200 launched on a normal sized PCB with TSOP RAM packaging.

To create more overclocker-friendly cards, manufacturers have altered the reference design in several ways.

The simplest, used by Triplex and Gainward, who not only sell the normal GeForce4 Ti 4200's, but also cards based around overclocking and are therefore equipped with faster RAM. Triplex has also hard-coded a faster default memory speed of 550MHz into the BIOS of its card, while Gainward relies on its bundled Expertool software to provide the user with automated core and memory overclocking functions.

Ti4600, caution must be taken to ensure that the larger PCBs actually fit on your motherboard

But the most extreme alteration comes in the form of ABIT's Siluro GF4 Ti4200 OTES. OTES stands for Outside Thermal Exhaust System and refers to the cooling solution used on the card, which is based on a large copper heatpipe. This cooler uses a heatpipe to transfer heat from the GPU to a series of copper fins – combined with a 7200rpm intake fan and a sealed plastic shroud, it creates one of the more distinctive cooling solutions we have seen. The intake is then vented directly out the rear of the case, which necessitates a double height backplate in order to fit the air intake alongside the TV-Out and monitor connectors.

Apart from this, the PCB is normal for a GF4Ti4200, and uses TSOP-packaged RAM. The card comes with a hardwired overclock to GeForce4 Ti4400 speeds, and is bundled with utilities to clock it even higher.

Over the next few months we can expect to see cards appearing with NVIDIA's refreshed GeForce4 Ti4200 chip, formerly codenamed NV28 but now officially dubbed NVIDIA GeForce4 Ti4200 GPU with AGP 8x. In terms of changes, there appears to be little difference between current generation Ti4200s and the AGP 8x flavours, apart from the added support for the AGP 3.0 standard.

The performance boost seen when going to 8x AGP is minimal, so it is doubtful that these new cards will provide us with anything above and beyond the current batch of GeForce4 Ti4200 designs.

But for now we have a series of very attractive cards that promise to push the boundaries of performance in a variety of different ways, without costing the earth.

This is a claim that we have been very eager to put to the test.

'...the mid-to-high end GeForce4 Ti4400 chip has been discontinued and the GeForce4 MX has not made the impact of its predecessor, the GeForce2 MX.'

impact of its predecessor, the GeForce2 MX.

There's one simple reason behind this: the GeForce4 Ti4200 is relatively cheap, delivers great performance stock, and with some simple overclocking can perform well beyond its price tag. Card manufacturers are waking up to this, and several have done something that would have been unheard of until recently: messed around with NVIDIA's reference designs to create a new breed of FrankenForces – Ti4200 cards that barely resemble the specs and looks of the reference designs.

Traditionally, NVIDIA has made card manufacturers strictly adhere to the

ASUS and Albatron have taken the design changes one step further: both have foregone the simpler, smaller PCB of the reference design and instead adopted the large PCB seen in the GeForce4 Ti4400 and Ti4600.

To accompany the larger PCB they've used the better BGA-packaged RAM from these higher end models instead of TSOP packaging. Albatron has combined this with a large copper heatsink for the GPU. Both sport the same clock speeds as each other. It must be noted that ASUS has adopted this configuration for its Deluxe card only, which means that the price also includes such extras as 3D glasses.

However, it means that like a



ABIT Siluro GF4 Ti4200 OTES

Website: ABIT www.abit.com.tw

Supplier: Synnex www.synnex.com.au

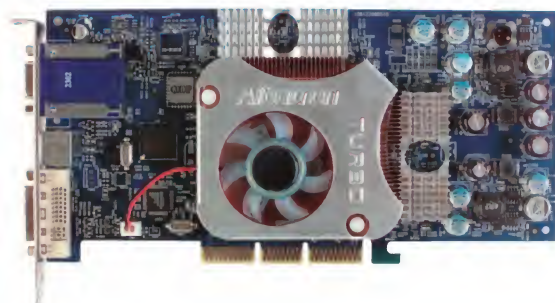
Price: \$360

Memory: 64MB

Default speed: 274MHz core / 553MHz RAM

Overclocked speed: 300MHz core / 590MHz RAM

Using ABIT's patented OTES (Outside Thermal Exhaust System) cooling, the Siluro GF4 Ti4200 OTES has the highest default speed of all the cards tested, with the clocks set to the same speed as a Ti4400



Albatron Ti4200 Turbo

Website: Albatron www.albatron.com.tw

Supplier: QTD www.qtd.com.au

Price: TBA

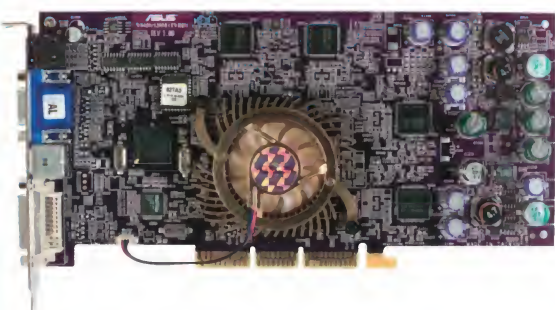
Memory: 128MB

Default speed: 259MHz core / 553MHz RAM

Overclocked speed: 300MHz core / 599MHz RAM



Albatron has strapped the GeForce4 Ti4200 GPU on a full-sized PCB, with BGA RAM packaging and a huge copper cooler on top. It performs incredibly well and comes without the unneeded extras of the ASUS, earning our Hot Award.



ASUS V8420 Deluxe GF4 Ti 4200

Website: ASUS www.asus.com

Supplier: Achieva www.achieva.com.au

Price: \$469

Memory: 128MB

Default speed: 260MHz core / 551MHz RAM

Overclocked speed: 320MHz / 665MHz RAM

Continuing the line of ASUS' Deluxe video cards, the V8420 is another GeForce4 Ti4200 that utilises a full-sized PCB and BGA RAM. This is a big contributor towards the stunning overclocking performance that this card delivers.



Gainward GF4 Powerpack! Ultra 650/XP Golden Sample

Website: Gainward www.gainward.com.tw

Supplier: PC Range www.pcrange.biz

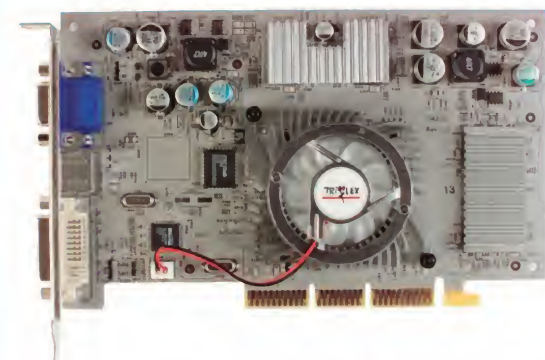
Price: \$369

Memory: 128MB

Default speed: 249MHz core / 445MHz RAM

Overclocked speed: 310MHz / 564MHz RAM

Gainward has a long legacy of building cards for overclocking, and such cards are suffixed with 'Golden Sample'. This model, apart from a phenomenally long name, stands out thanks to its certified overclockability.



Triplex Millenium Silver Ti4200

Website: Triplex www.triplex.com.tw

Supplier: Oxygen www.oxygen.com.au

Price: \$330

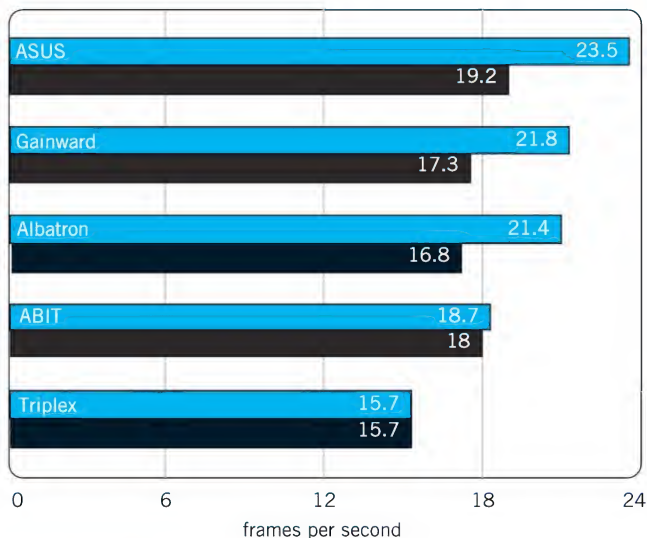
Memory: 64MB

Default speed: 249MHz core / 553MHz RAM

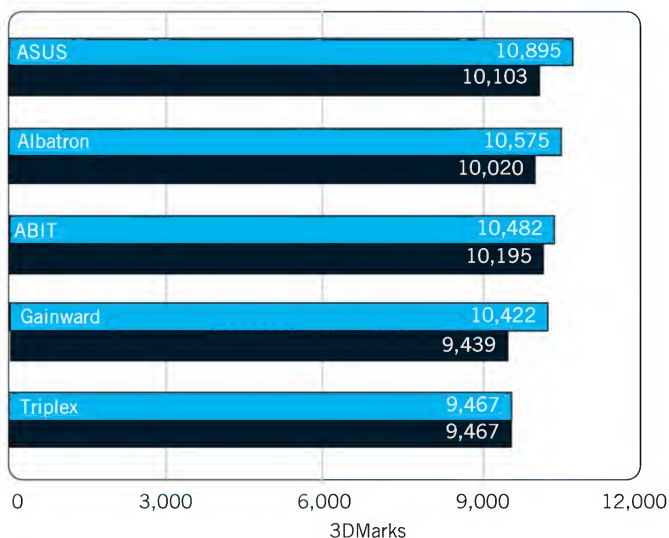
Overclocked speed: 249MHz core / 553MHz RAM

Triplex's silver PCB is partially designed for looks and partially for cooling. This card does have a higher RAM clock, however it suffered from instability when run at anything but its default speed.

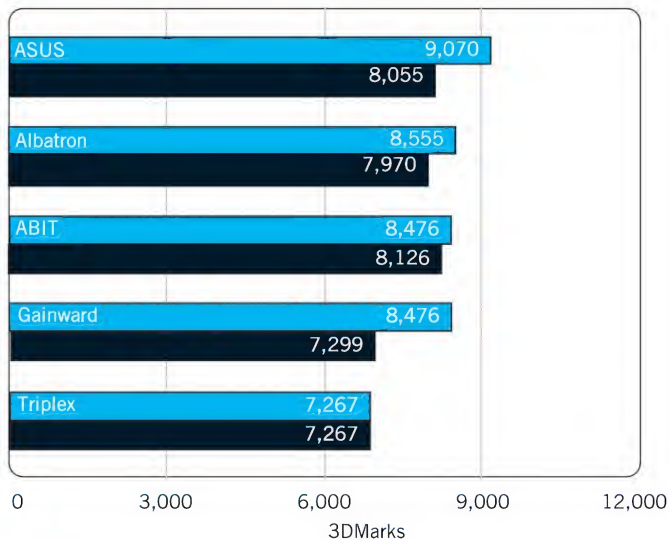
Codecreatures - 1,280x1,024



3DMark2001SE - 1,024x768



3DMark2001SE - 1,280x1,024



Overclocked

Default

Freaks of the nature test

To test these cards, we began by running them at their default speeds, and afterwards cranked the core and memory speeds up as far as they could go, without showing display artefacts or crashing out altogether. We used the official Detonator 30.82 drivers, instead of the still beta 40.x series drivers, and Powerstrip (www.entechtaiwan.com) for overclocking.

Rather than the excruciatingly similar results that we normally see when testing cards based upon the same graphics chip, these beasts show a range of results, as well as demonstrating distinct strong and weak points.

The first thing we need to point out is that the Triplex card seemed incapable of being clocked above its hardwired speeds. These speeds are still higher than stock, and performance is still respectable, however it could not be pushed any higher than it already was.

At default speed, ABIT's card — the Ti4400 in Ti4200's clothing — stood ahead of the pack, thanks to the high default clock speeds. Close behind were ASUS and Albatron, and these three cards generally performed quite close to each other in 3DMark2001SE.

None of the cards here should be considered slow. The Gainward card is the only one here that is set to NVIDIA's reference speeds in the BIOS, all other cards at least have RAM set to higher than default clocks, however when overclocked further the picture changes dramatically, as is shown by the phenomenal speeds that can be reached by the ASUS card when overclocked, which help to push it ahead in all the tests.

In Codecreatures, which uses a full 128MB of video RAM, the 128MB cards leapt ahead of the 64MB ones. Again the ASUS card was the fastest, and the Triplex card the slowest.

There are three real standouts in our testing. For those who have developed a fear of overclocking, or just want to throw a card into their system and forget about it, the ABIT Siluro GF4 OTES is a good solution, as long as you don't mind sacrificing your first PCI slot. It is fast, cool and remarkably quiet for something built around a 7200rpm fan.

On the other hand, those who get off on cranking the clock speeds as high as possible will want to take a look at the ASUS V8420 Deluxe GeForce4 Ti 4200 or the Albatron Ti4200 Turbo. In our tests we found that the ASUS card has insano overclocking overhead, hitting the highest clock speeds and delivering the benchmark results to match.

Our only issue with the ASUS offering is that you cannot get this particular card in a non-deluxe packaging, meaning that you may end up paying for extras that you will never actually use.

That is where the Albatron card shines: with respectable overclocking performance, a full length PCB and BGA RAM, this is a no-nonsense performer without the extraneous frills that make up ASUS' Deluxe packaging. It is heavier than the ASUS thanks to the copper cooler, but this is not at all problematic once the card is mounted onto the motherboard and bolted onto the case. The Ti4200 is all about getting the best price/performance and the Albatron card exemplifies this fact perfectly.

If you are looking to balance price with performance, then the GeForce4 Ti4200 chip is the one you want, and as card manufacturers now actively tinker with their cards to get the best performance out of them, we are spoiled for choice, with an option that caters for everyone's different needs.



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*Source: IT Market Insights Feb '02



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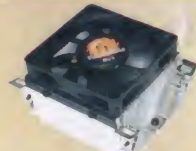


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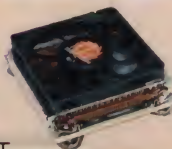
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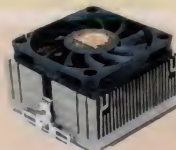
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INTEL P4 SOCKET
478 upto 3.0 GHz



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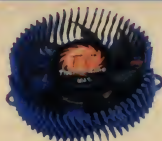


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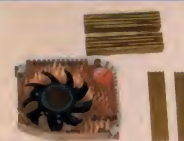
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A time to chill

Are you prepared for the serious wattage that your spanking new CPU pumps out, or been burned while trying to use your finger as a temperature probe? Dodgy chunks of shiny metal always attract the ill-informed techie, so Bennett Ring has been whipping the fins off some Intel and AMD heatsink fans to discover which ones will keep your CPU in the green, and the ones that will have you screaming towards the nearest asbestos suit.

It's that time of the year once again.

No, not the time when you give presents to all your relatives before proceeding to get blind drunk and spending the rest of the day explaining to them why they're a bunch of twits.

We're actually talking about the time of the year when *Atomic* compares most of the heatsinks currently available on the Aussie market and declares one the best solution for cooling down your now overheating CPU.

There's a reason overclockers hate the summer, and it's not because we have to strut the beach in our speedos and blinding albino tans.

As the summer temperatures start to heat up, overclocked CPUs start to slow down, thanks to overheating and the resulting BSODs. So we've looked at a total of fifteen AMD Socket A-compatible heatsinks and five Intel Socket 478 heatsinks. AMD CPUs have more issues with

heat, so it's only natural that there is a much wider selection of AMD heatsinks. To test the different HSFs, we used two pieces of equipment – our custom built CPU toaster, aka Chernobyl, and a sound level meter. There should now be no reason for a hundred and one different readers to send us mail about how the motherboards we used to test the heatsinks reported very inaccurate temperatures. We hope.

So, without further ado, let's get on with the testing. All temperatures were taken with Chernobyl set to output 80W, which is around the peak output of the new 3.06A GHz Pentium 4, while ambient temperature remained a constant 20C throughout the tests.

It must be noted that the temperatures we measured are not directly comparable to the temperatures you'll see with your CPU. However, they do provide a yardstick with which to compare the heatsinks with one another.

BLUE: INTEL RED: AMD



5. INTEL REFERENCE HEATSINK (OLD DESIGN)

Price: n/a

Supplier: Intel www.intel.com

This is the model that ships with all Pentium 4s. While it's one of the quieter Intel models in the roundup, its performance is definitely at the tail end of the pack. In fact, it's a whole 9C hotter than the new Intel cooler, showing that the R&D dollars Intel has pumped into cooling designs has been spent well.



3. GLACIALTECH IGLOO 4310 PRO

Price: \$33

Supplier: CASSA www.cassa.com.au

If this thing weren't such a bitch to mount, thanks to its undersized clip which managed to bend the aluminium fins when in place, we'd have nothing but average things to say about it. Average temperature, average sound levels. Pity about the fact that it is a total bitch to mount. How hard can it be to build a decent clip?



4. THERMALTAKE P4 VOLCANO 478

Price: \$35

Supplier: Anyware www.anyware.com.au

After being deluged by approximately six hundred and thirty two different models of Thermaltake Athlon coolers, it was surprising to receive just one Thermaltake P4 heatsink. And like every other third-party cooler, this jobbie simply couldn't compete with the new Intel reference design.



2. CPUMATE K300

Price: n/a

Supplier: CpuMate www.cpumate.com.tw

This HSF is perhaps the most revolutionary of all the Pentium 4 HSFs, with a sideways design incorporating twin heatpipes and a radical new mounting chassis. Matching this innovation is its excellent performance, which equaled the new Intel cooler; unfortunately its sound levels were quite high.





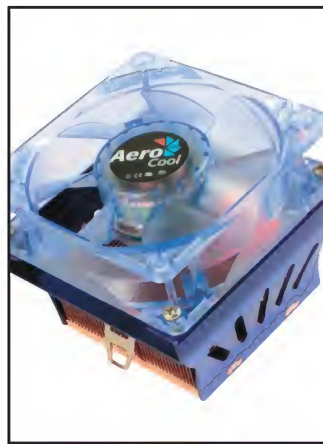
1. INTEL REFERENCE HEATSINK (NEW DESIGN)



Price: n/a

Supplier: Intel www.intel.com

Looking like an updated Orb, the new Intel reference design has a copper slug in its base, a new fin layout and a unique 'embedded' motor within the core of the heatsink that provides vastly improved performance over the previous generation of Intel coolers, all at a lower sound level. Easily the best Intel cooler around.



12. AERO COOL THE GLACIER

Price: TBA

Supplier: CoolPC

www.coolpc.com.au

Aero who? Aero Cool, dude, cool. Pity it wasn't. Well, it didn't perform too badly, but this all copper behemoth once again reinforced the notion that high quality heatsink materials don't mean jack unless they're used in a good design. At least it's gentle on the eardrums, but we expected more.



15. JUST COOLER P-8000

Price: \$22

Supplier: Anyware

www.anyware.com.au

For a cooler so big, this beast really sucked anus. Look at that temperature – ouch! This was one of the coolers that we remounted to make sure that it really was simply a bad performer. And after testing it again, we could come to no conclusion other than that this thing is a piece of crap. Avoid at all costs.



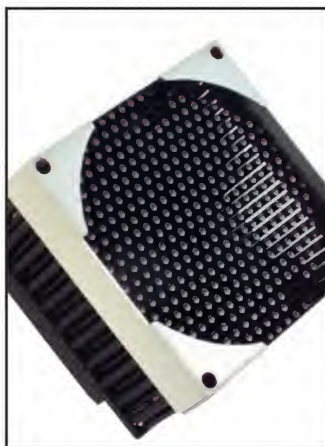
11. AERO COOL X FACTOR

Price: TBA

Supplier: CoolPC

www.coolpc.com.au

While its performance and sound levels weren't too shabby, at least when compared to some of the poorer models that we've seen in the roundup, this unit did have one exceptional feature – a shiny silver fan! At last, we hear you cry! What more could you ask for? Oh, that's right, lots.



14. ALPHA PAL8045

Price: \$90

Supplier: CoolPC

www.coolpc.com.au

Considering the excellent reputation Alpha coolers have, we were astounded to see this unit perform so badly. Not even a beefy Delta 80mm fan could help this sucker out. We're putting its bad results down to the custom locking mechanism. Considering the high price made the results even more disappointing.



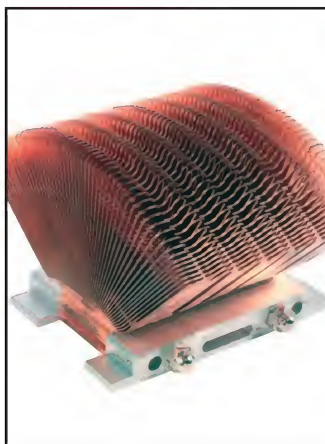
10. SWIFTECH MCX462

Price: \$125

Supplier: PC Cooling Australia

www.pcca.com.au

Just like the Alpha cooler, our high expectations were shattered when we saw its high peak temperature, especially when you consider that it is the most expensive HSF in the roundup. This is probably due to the mounting mechanism used on the cooler, which simply seems unable to supply enough pressure.



13. ZALMAN CNPS6000-CU

Price: \$75

Supplier: PC Cooling Australia

www.pcca.com.au

Designed to offer a unit with reasonable performance with the lowest possible sound levels, this cooler did exactly that. It wasn't the worst performer of the bunch, but its sound levels were easily the best. So if you're not into overclocking and want the quietest solution possible, the Zalman is an attractive option.



9. COOLINK COOL H2TWINBREEZE

Price: \$38

Supplier: PC Range

www.pcrange.biz

It's nice to see HSF designers trying wildly new designs. In the case of the H2TB, twin side-mounted fans make this cooler very different to the rest of the pack. Thanks to these twin fans, this unit is remarkably quiet, yet offers a respectable level of performance. In all, this HSF is a nice compromise between performance and sound levels. ▷



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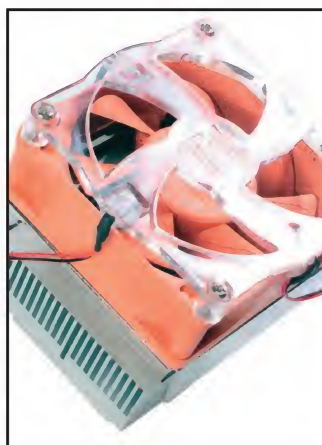
8. SWIFTECH MCX370

Price: \$68

Supplier: PC Cooling Australia

www.pcca.com.au

This cooler uses a special pin configuration known as a 'helicoid pin design'. These are basically screw-like protrusions on each pin that double the pin surface area. Sounds cool, but doesn't seem to do a great deal judging by this unit's average performance. Once again, it appears that the specialist mount doesn't work.



4. THERMALTAKE VOLCANO 9 COOL MOD

Price: \$56

Supplier: Anyware

www.anyware.com.au

This cooler is just plain bizarre. It's a heatsink, a neon light that changes colour depending on hard drive activity, and a temperature probe to automatically control fan speed, all with very respectable performance. For those looking for something extra from their HSF.



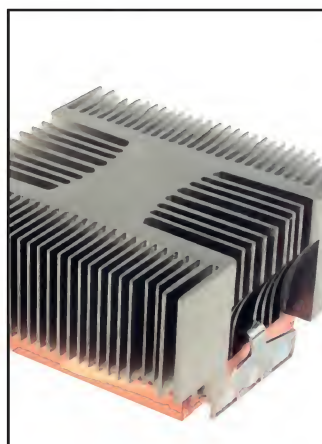
7. THERMALTAKE VOLCANO 6CU/6CU+

Price: \$37

Supplier: Anyware

www.anyware.com.au

This heatsink fan is one of those products that proves the old 'sometimes the simpler things in life are better' cliché. Although it looks like a plain old Aluminium heatsink, this HSF has a copper slug embedded in its base, and provides decent results at a low price.



3. THERMALRIGHT AX-7

Price: \$84

Supplier: Below-0 www.below-0.com

Look at our top three AMD coolers. Notice anything? Other than the fact they're all fairly expensive, they all happen to be built by Thermalright. No, they didn't slip us a couple of hundred bucks to make sure of this. Like all of the Thermalright models, the AX-7 is beautifully crafted, with this model comprised of a mix of copper and Aluminium.



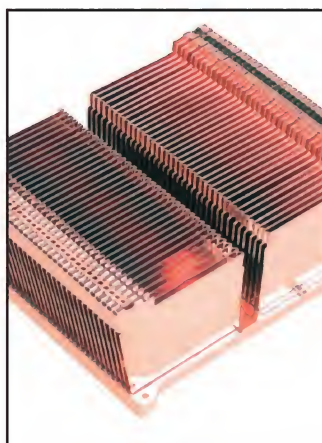
6. GLOBALWIN TAK68

Price: \$50

Supplier: CoolPC

www.coolpc.com.au

Like the Coolink H2TB, this unit adopts a twin side-mounted fan configuration. It also employs a new clip design, which uses a unique screw down mechanism. For once, a non-standard mounting mechanism seems to do the job well. A competent performer that won't leave you with bleeding ear drums.



2. THERMALRIGHT SK-6+

Price: n/a

Supplier: Thermalright

www.thermalright.com.tw

Thermalright somehow manage to squeeze maximum performance out of simple designs. For a small cooler, this heatsink performed well, and had the second best temperature level. The 60mm Delta fan we used probably helped, but as we've seen with the Swiftech model, a Delta doesn't guarantee success.

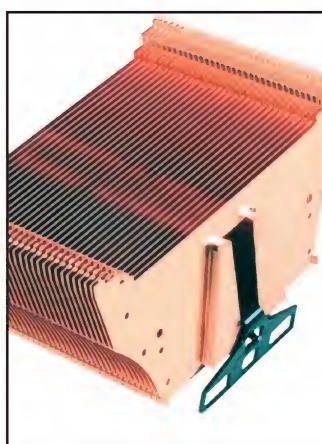


5. COOLERMASTER HHC-001

Price: \$86

Supplier: Protak www.protak.com.au

It's a simple fact of life – as coolers increase in cooling performance, their sound levels begin to approach that of a Boeing 747 on takeoff. The HHC-001 is no exception, being in the top three when it comes to audio pollution. Other than this, the only other noteworthy aspect of this copper beastie is that it's the only AMD heatsink that uses a heatpipe.



1. THERMALRIGHT SLK-800

Price: \$110

Supplier: PC Case Gear

www.pccasegear.com.au; Below-0 www.below-0.com

This is simply a stretched out version of our #2 cooler, the SK-6+. Yet somehow this small change in size managed to drop the temperature by a massive 7C. And that's with a quieter 80mm Delta fan. If you're after the best Socket A heatsink, the SLK-800 is your only option.



Ascending New Visual Heights



Leave competitors in the dust with Xabre's powerful 8X8 graphics capabilities and world domination may soon be yours



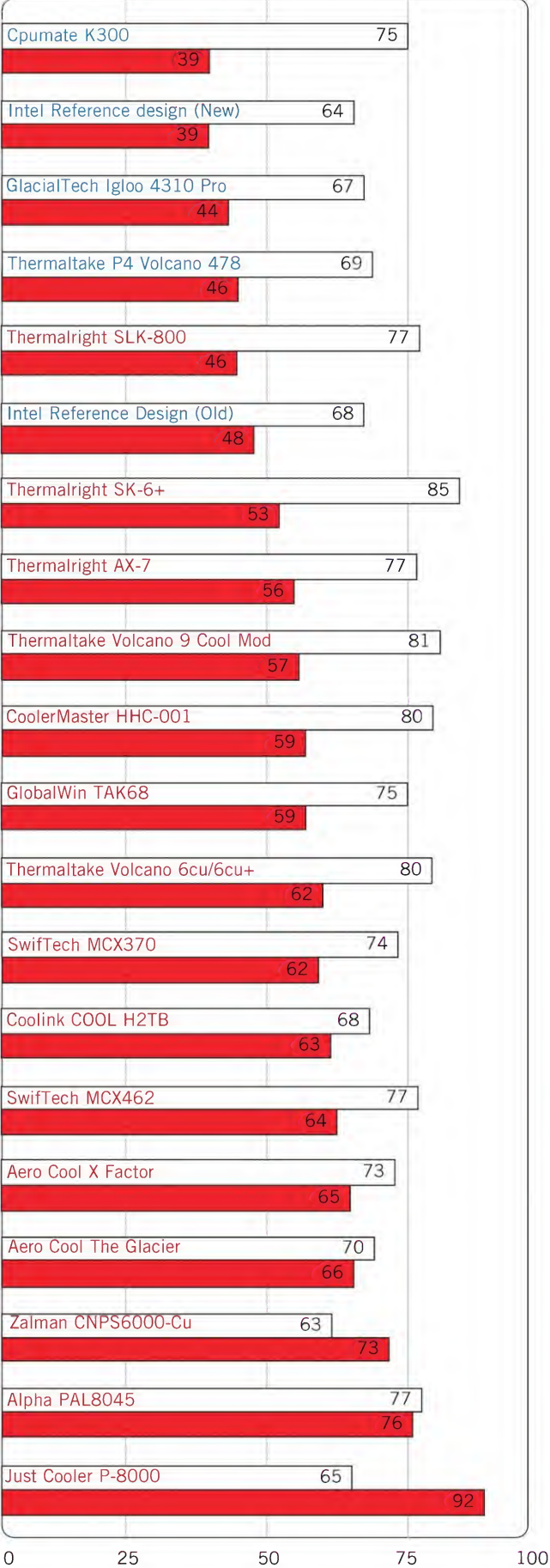
Xabre's cutting-edge 8X8 graphics engine is a successful marriage between AGP8X and DirectX8.1 technologies.

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www.xabre.com

SYSMark2002



The right way to test HSFs

The email from Ben Mansill was fairly short and simple. 'Your mission, should you choose to accept it, is to produce a HSF test-bed. It would have to have a thermal probe inside for measuring different HSF temps. It would also have to have adjustable wattage, from 60 to 150. This way we could test many HSFs without getting fiddly on a mobo, plus, our testing would be much more accurate.' The email then self-destructed.

Well, that sounded simple enough – or so I thought initially! I threw a million ideas around that all proved to be 'fundamentally flawed', until an electronics engineer I know came up with the perfect solution, which also happened to be the simplest and also the most accurate.

The rough schematic that resulted was this: an infinitely variable 240V 2A transformer (Variac), supplying power to a custom-built 190W 'cartridge' heater mounted inside a machined block of high-conductivity grade copper. The copper 'core' would have interchangeable blocks at the top, simulating specific CPU die dimensions. A thermal probe would be fitted at a point that would simulate the centre/bottom of each die. The idea of using interchangeable die-blocks meant that original retention clips could be used by cutting and machining 'pieces' of motherboard, with the clips still in place, to act as the 'base' for each CPU platform. This method would also allow the die-blocks to be clamped down firmly into place on top of the main core. Did I say simple? Right.

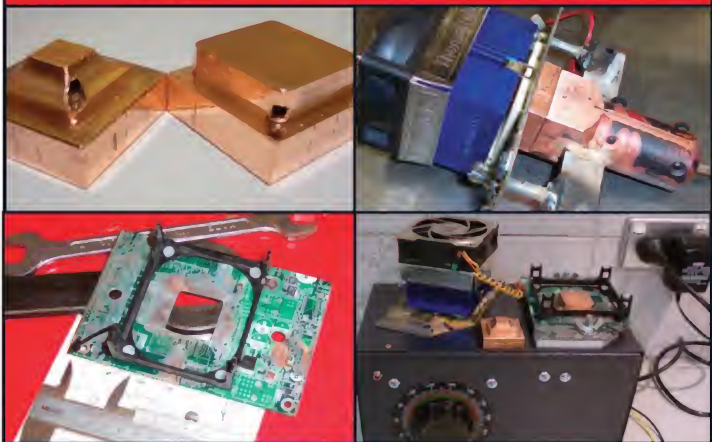
It was time to get busy in the workshop. To ensure precise adjustments could be made during testing, the Variac was specifically built for this application, using a 'small contact patch' brush-wheel rather than the usual 'brush' connector. The core and die-blocks were machined out of one 38mm x 38mm length of solid copper. The machining was carried out to two-decimal point accuracy, so that the components were a 'near perfect' surface-to-surface fit, maximising the consistency of the thermal 'hook-up'.

The P4 was straightforward to simulate, with the 'die block' being machined to the exact dimensions of the OEM heat-spreader.

In the case of the Athlon, an original CPU substrate was machined so that the tip of the 'die-block' protrudes through exactly as the original did, ensuring that the heat-retention effect of the ZIF socket is recreated. The rubber cushions are also useful for supporting a HSF in its correct alignment.

Initial testing and final calibration was carried out using a ThermalTake Volcano 7+, supplied by PC Case Gear (www.pccasegear.com) as this HSF can be used 'across platforms', and it has gained respect with both AMD and Intel users for delivering good performance. The final test results were 'text-book', proving that the test-bench was operating as expected.

Ron Prouse



AGP 8X

Graphic Card

WinFast CINEMA BOX upgradeable

AGP 8X

& Motherboard



A180 / A280 Graphic Card



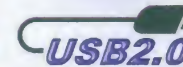
- ⊖ NVIDIA GeForce 4 MX440/Ti4200 with AGP 8X
- ⊖ AGP 3.0 supports AGP 8X, 4X, and 2X.
- ⊖ Accuviv Antialiasing™ Engine
- ⊖ nView Display Technology
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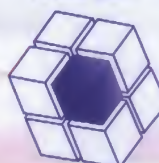
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REVIEWS

How far we've come

Twelve month's seems like a couple of months in the life of Bennett Ring, but it's a long, long time in the world of IT.



As though it were only yesterday, I remember trying to recover from a killer Christmas hangover that threatened to implode my dehydrated brain, and how I spent most of a sunny Perth Boxing Day tracking down rogue vomit pools with a high pressure water sprayer on the back pergola. Oh what a fun day it was.

And here we are again, Christmas is almost upon us, my rapidly depleting bank account proof of this fact. So I thought it would be an appropriate time to pull a bit of a Scrooge, and travel back through time to see just how far hardware has advanced over the last twelve months. You might be surprised. My trusty encyclopedia for this adventure through history just happens to be *issue 11* of *Atomic*. You'll know it as that gorgeous issue with the red PCB of an nForce motherboard, taking up the majority of our front cover.

Speaking of which, the original nForce motherboards didn't do quite as well as expected. The reason? Six dastardly characters: K-T-2-6-6-A. In other words, VIA's killer DDR platform, which swept any performance advantage the nForce had under the carpet, and at a much more reasonable price. When it came to memory, 133MHz DDR-RAM was becoming firmly entrenched as the best performing memory solution for the Athlon, while the P4 was still stuck with expensive RDRAM as it waited for Intel to extricate itself from its money making schemes with Rambus. Fast forward to today, and we've now got 400MHz (200MHz actual) DDR-RAM – unfortunately a lack of ratification by JEDEC has made purchasing this type of RAM a memory minefield. Still, if you can get it to work, you're looking at a theoretical increase in memory bandwidth of 50% – not a bad effort for 12 months considering that memory doesn't ramp up in speed anywhere near as fast as the other components within our PCs. Luckily for Intel lovers, the P4 now supports

DDR-RAM, just like its AMD counterpart, with RDRAM becoming the memory type of choice for workstation users, the rich and, of course, tossers.

Unfortunately hard drives haven't received anywhere near as much of an improvement in speed, but the same can't be said about capacities. Twelve months ago a 7,200RPM, ATA100 40GB drive would have been pretty standard for a new home PC's hard drive, but today it's not uncommon to find an 80GB or even a 120GB drive within new PCs.


The situation in the CPU world has experienced a quantum shift. Back in the land of *issue 11*, AMD was on top of the performance pile with its new Athlon XP, at a much cheaper price than Intel's competing Pentium 4. The Athlon XP 1800+ had just debuted at 1.53GHz on a 0.18-micron process, and this whipped the buttocks of the 0.18-micron 2GHz Pentium 4 – regardless of the Athlon XP's 500MHz clock speed deficit. However, over the last year the Pentium 4 has come of age, managing a massive 1GHz increase in clock speed to 3.06GHz on a 0.13-micron process. It's also had a boost in frontside bus speed, a doubling of cache, and the added activation of the chip's Hyper-Threading capabilities to help it out. On the other hand, AMD's Athlon XP has remained relatively stagnant; rising in clock speed by 700MHz to 2.25 GHz, also on a 0.13-micron manufacturing process, with a small increase in frontside bus speed. As a result, the P4 has claimed the high performance crown, while the Athlon XP still remains quite competitive, especially when price is an issue. How long this continues remains to be seen.

The only other component that has experienced such a huge rise in performance is the ever-important video card, and this too has seen a role shift, with 'da boss' becoming 'da bitch' in a glamorous display of power. If in December 2001, you didn't have an

NVIDIA GeForce3 Ti500-based display card, you weren't a hardcore gamer. ATI had just released its RADEON 8500 chipset, however the small performance increase it had over the Ti500 was soon dispelled, thanks to NVIDIA's superb driver development. Both of these cards had around seven to eight GB/s of memory bandwidth, finally giving gamers the power to play all their games in glorious, rich 32-bit colour. And we thought we had it all.

Today NVIDIA is now ATI's little whipping boy, thanks to the delay of its hotly anticipated NV30 chipset. As we've seen in the last couple of months, the R300 (the behemoth that powers the RADEON 9700 PRO) with its 20GB/s or so of memory bandwidth thoroughly trounces the GeForce4 Ti4600 – its own 10.4GB/s of memory bandwidth is now looking decidedly average. Both cards have also brought massive gains in triangle performance, with the 9700 pumping out a phenomenal 325 million triangles per second in ideal conditions. Compare this to the GeForce3 Ti500, which struggled to give us around 35 million triangles per second, and we've been given almost a tenfold increase in triangle throughput over the last year. Holy flying fillrates Batman!

When you put the specifications for the hardware from a year ago side-by-side with the specifications for today's tech, it's hard not to be impressed with the amazing gains in performance the little men in white coats have delivered to us, all at the same cost as the old tech. Now that you're impressed with the toys we've got to play with today, spend a moment imagining where we're going to be in another twelve months time.

Who knows, VIA's C3 could be the ultimate CPU, while our gaming graphics might be powered by Trident's latest and greatest video chipset. Or not. But regardless of who's providing the technology, it's still going to make today's hardware look like children's toys. 

Atomic Benchmarks

The way we do the things we do.

Here at *Atomic*, it is our primary intention to give you the final word on the latest in hardware and PC technology. An integral part of determining the performance of a particular piece of hardware is benchmarking, and this is something that we take very seriously in the *Atomic* Labs.

SYSmark2002

SYSmark is a product of the collaboration between industry group BAPCo (www.bapco.com) and MadOnion.com (www.madonion.com). It is one of the next-generation application benchmarks and is designed to more accurately replicate the day-to-day workload that a system is subjected to. The focus of the benchmark is on Internet Content Creation and Office Productivity tasks, in order to generate a final performance rating.

SiSoftware Sandra 2002 Professional

Sandra, a nifty program from SiSoftware (www.sisoftware.co.uk), is a comprehensive benchmark and diagnostics utility. It contains dozens of special module applets that can retrieve detailed information about the specifications and settings of a system by polling each component's built-in firmware or BIOS. Sandra also features a small suite of synthetic

benchmarks for specific components such as the CPU, memory, CD-ROM and hard disk. It also features a burn-in wizard for stress-testing overclocked systems.

3DMark2001SE Pro

3DMark2001SE Pro from MadOnion.com is the next progression of the popular benchmark utility. It also uses the MAX-FX engine and heavily emphasises DirectX 8.1 functions, including programmable shaders. The results are not comparable with results from 3DMark2000 Pro.

Serious Sam: SE

Serious Sam: The Second Encounter is used for testing OpenGL performance. For game tests we use the Cooperative demo, which outputs an average framerate trimmed of excessive peaks. It also contains a fillrate test, which outputs fillrates for various texturing methods and is useful for comparisons between video chipsets.

HSF testing

To test HSFs, we use our Athlon XP test bed, which uses an internal temperature diode. SiSoft Sandra 2002 is run in looping burn-in mode, with both CPU tests selected for 30 minutes, after which the load

temperature is recorded. The CPU is then left to idle for 30 minutes before the idle temperature is taken.

Quake 3: Arena *AtomicMPC* Demo

Quake 3: Arena (Q3A), from id Software, is the very popular first person shooter representing widely used OpenGL gaming technology. Q3A has a built-in benchmarking utility and built-in demos that can test graphics card performance. These demos are fairly simplistic, and are not representative of the worst conditions that the game can offer to a graphics card. So we developed our own *AtomicMPC* demo that pushes the hardware as far as possible.

Other benchmarks

Sometimes we need to break down the tests into more specific areas, such as hard disk performance, memory performance or a particular facet of 3D like T&L. For these specific purposes we can draw on a vast number of applications, games and dedicated benchmarks such as CD Speed 99, DisplayMate, Dronez, MDK2, or Adaptec ThreadMark. We also use a Lian Li temperature probe from Anyware (www.anyware.com.au) for tests that involve the measurement of temperatures, such as HDD heatsinks. □



The *Atomic* HOT award is given only to the most kickarse products to hit the labs, ones that score 9 or greater. The ones we'd want.

Atomic testbench specs

Both systems are running Windows XP Professional with Service Pack 1, DirectX 8.1 and the latest chipset and video drivers.

- AMD Athlon XP 1800+ system – ASUS A7V266-E motherboard (supplied by CASSA: www.cassa.com.au)
- Intel Pentium 4 2GHz – ABIT BD7II-RAID motherboard (supplied by ABIT: www.abit.com.tw)

Common components

- Samsung 256MB PC2700 DDR RAM (supplied by CASSA)
- Samsung 256MB PC800 RDRAM (supplied by CASSA)
- Hercules Prophet II GTS 32MB (supplied by Guillemot: <http://au.hercules.com>)
- 20GB Ultra DMA/100 7,200rpm hard disk drive
- Hercules Prophet II GTS 32MB (Supplied by Guillemot: www.hercules.com)
- Sound Blaster Live! Player (Supplied by Creative Labs Australia: www.creaf.com)
- ASUS 52X CD-ROM (supplied by CASSA)
- Belkin PCI FireWire card (supplied by Belkin: www.belkin.com.au)
- Belkin PCI USB 2.0 card (supplied by Belkin)

Benchmark settings

3DMark2001SE Pro

- 1,024 x 768; 16-bit colour; 16-bit textures; 16-bit Z-buffer; triple frame buffer
- 1,024 x 768; 32-bit colour; 32-bit textures; 24-bit Z-buffer; triple frame buffer
- 1,600 x 1,200; 16-bit colour; 16-bit textures; 16-bit Z-buffer; triple frame buffer
- 1,600 x 1,200; 32-bit colour; 32-bit textures; 24-bit Z-buffer; triple frame buffer

Quake 3: Arena *AtomicMPC* Demo

All tests use Quake 3: Arena 1.27g and our custom Q3A demo recorded by the *Atomic* staff.

- CPU testing: 320 x 240; maximum geometry detail; minimum graphics settings; high sound quality
- Graphics cards: Low quality = 1,024 x 768; normal quality graphics settings; sound disabled
- Medium = 1,280 x 1,024; maximum graphics settings; with all game sound disabled
- High = 1,600 x 1,200; maximum graphics settings; sound disabled

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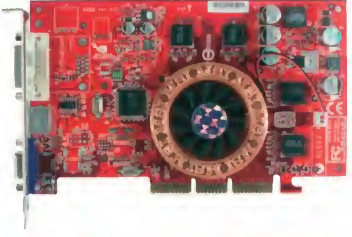


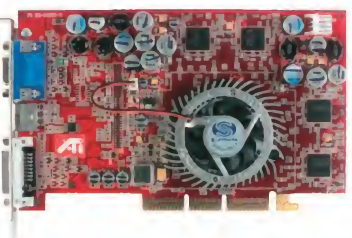

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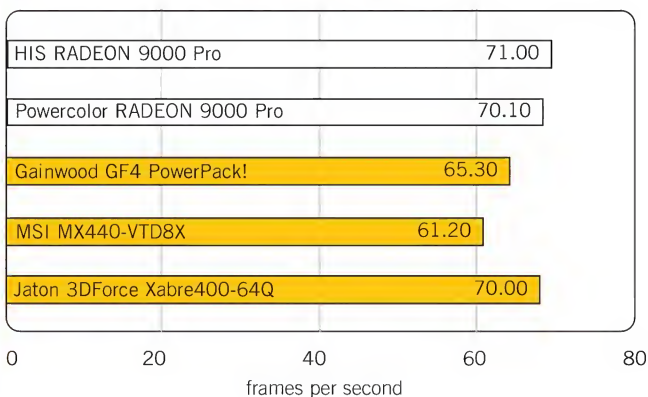


Framerate

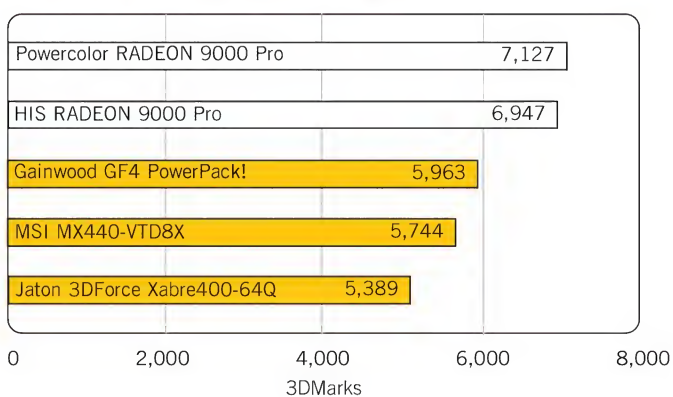
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	MSI MX440-VTD8X Specifications: GF4 MX with AGP 8x; 64MB DDR-RAM; AGP 8x; D-Sub; S-Video TV-Out; DVI and TV-In adaptor Core speed: 275MHz Memory speed: 513MHz Website: MSI www.msicomputer.com.au Supplier: MSI www.msicomputer.com.au Price: \$290
	Gainward GeForce4 PowerPack! Pro/600-8X XP Golden Sample Specifications: GeForce4 MX with AGP 8x; 64MB DDR-RAM; AGP 8x; D-Sub; S-Video TV-Out; DVI Core speed: 288MHz Memory speed: 589MHz Website: Gainward www.gainward.com Supplier: Hallmark www.hallmark.com.au Price: TBA
	Hercules 3D Prophet 9700 PRO Specifications: ATI RADEON 9700 PRO; 128MB DDR-RAM; AGP 8x; D-Sub; S-Video TV-Out; DVI Core speed: 325MHz Memory speed: 620MHz Website: Hercules au.Hercules.com Supplier: Hercules au.Hercules.com Price: \$969
	Sapphire RADEON 9700 Atlantis PRO Specifications: ATI RADEON 9700 PRO; 128MB DDR-RAM; AGP 8x; D-Sub; S-Video TV-Out; DVI Core speed: 325MHz Memory Speed: 620MHz Website: Sapphire www.sapphiretech.com Supplier: Achieva www.achieva.com.au Price: \$699
	Jaton 3DForce Xabre400-64Q Specifications: SiS Xabre400; 64MB DDR-RAM; AGP 8x; D-Sub; S-Video TV-Out; DVI Core speed: 250MHz Memory speed: 500MHz Website: Jaton www.jaton.com.au Supplier: Jaton www.jaton.com.au Price: \$219

Serious Sam SE – 1,024 x 768 – normal

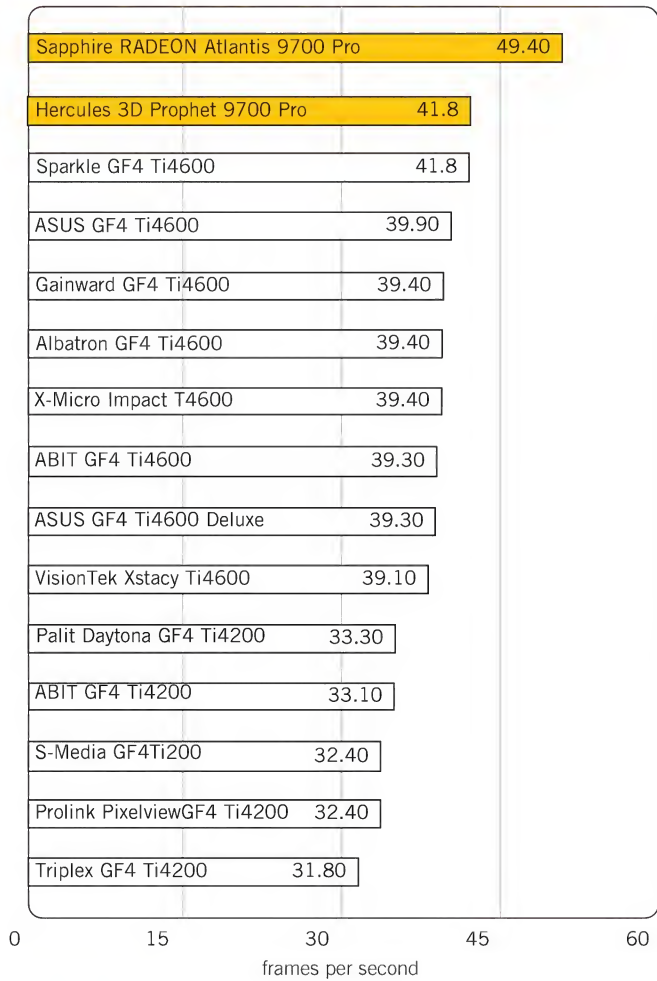


3DMark2001SE Pro – 1,024 x 768

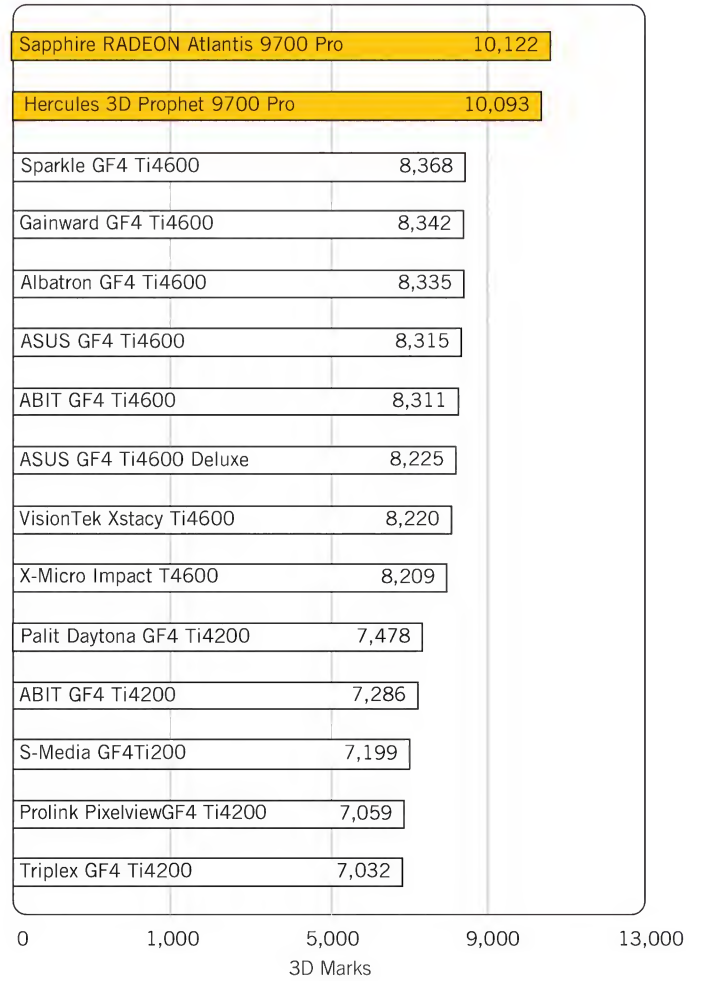


Performance video cards

Serious Sam SE – 1,280 x 1,024 – quality

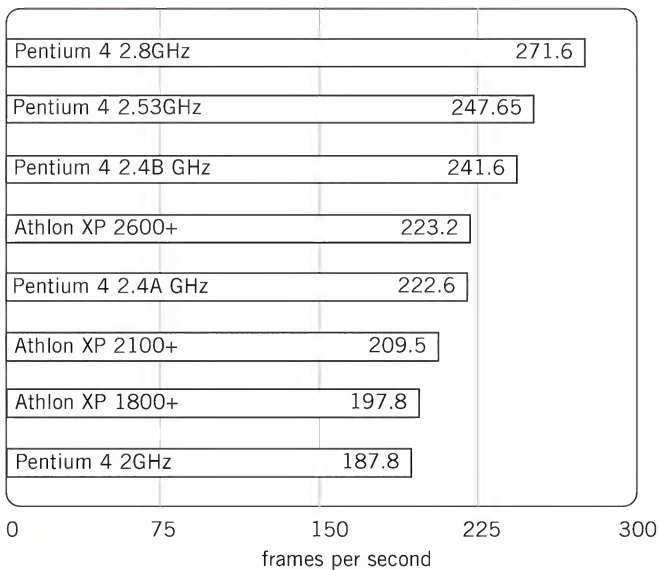


3DMark2001SE Pro – 1,280 x 1,024

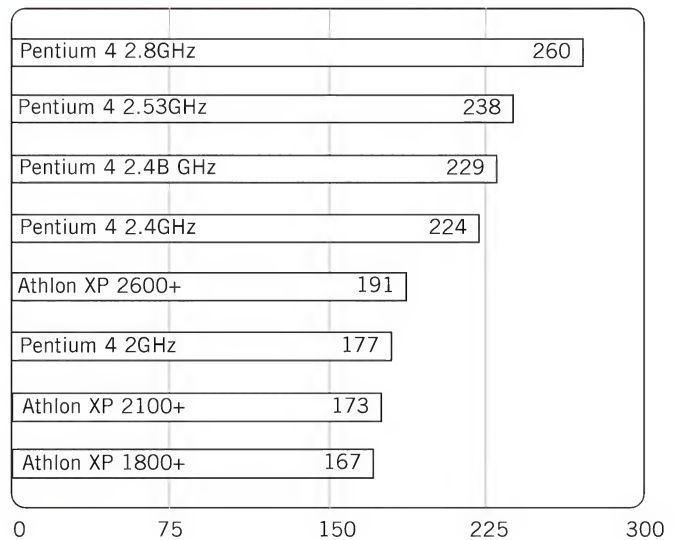



CPUs

Quake 3: Arena – CPU settings



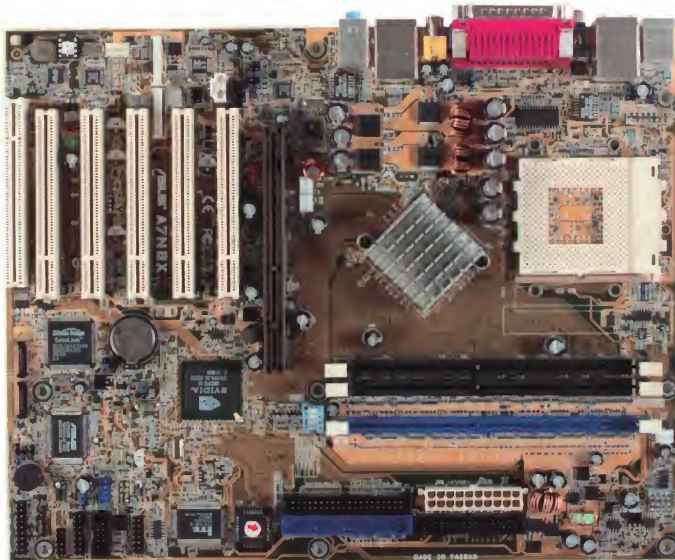
SYSmark2002 – rating



 New this month

ASUS A7N-8X Deluxe

John Gillooly checks to see what ASUS can do with the nForce2.



The nForce chipset never ended up changing the world as NVIDIA had intended. It was delivered way too late and lacked widespread manufacturer support, and despite being packed with features, VIA smacked it down with the launch of the KT266A chipset that outperformed nForce in most benchmarks.

NVIDIA has been given a chance to make up for the disappointment of nForce with the launch of nForce2. So far we have only seen early engineering samples of this chipset, but with the ASUS A7N-8X board we have had our first opportunity to get a good look at the performance of nForce2.

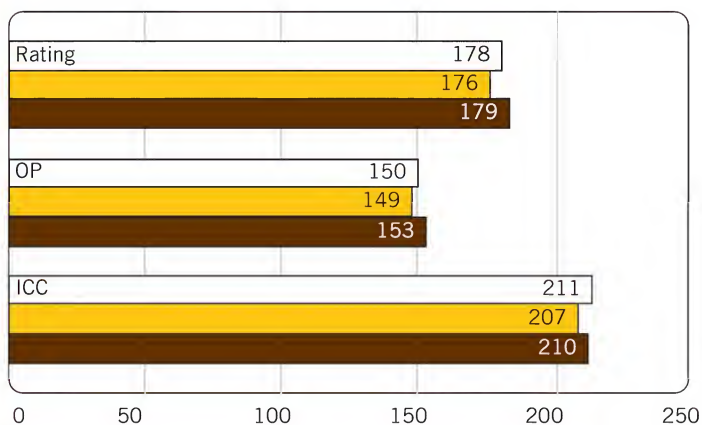
There are a few variants of nForce2, and the A7N-8X has what will probably end up being the most commonly used one. But before we get too far into that, here is a quick précis of the marketing nomenclature that NVIDIA has adopted, apparently to demonstrate to us just how far removed from normal chipsets that nForce2 is – rather than chipset, nForce2 is either a 'Performance Motherboard' or 'Graphics Motherboard' depending on whether it has integrated graphics or not. Instead of a Northbridge, nForce2 has a 'System Platform Processor' (SPP) or an 'Integrated Graphics Processor' (IGP). Rather than a Southbridge it has a 'Media and Communications Processor' (MCP), just like it's console brother, the Xbox.

The A7N-8X is a Performance Motherboard, with a System Platform Processor and a Media and Communications Processor. Got that clear?

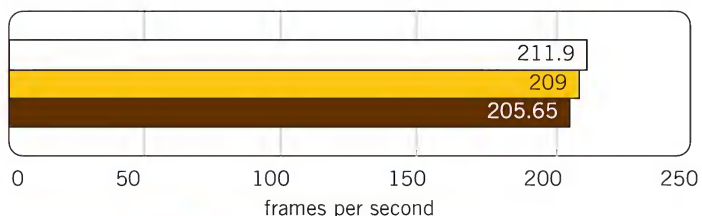
In real world terms, this means that the board lacks an integrated GeForce4 MX level graphics core, however, it still supports other nForce2 features such as NVIDIA's second generation dual channel DDR controller, dubbed DualDDR, Dolby 5.1 audio, dual Ethernet ports, AGP 8x and support for 333MHz FSB Athlons.

It is an impressive feature list, much like the original nForce, but the proof is in the performance. So we tested the board using two different memory configurations with our standard Athlon XP 1800+ CPU (for tests with the 333MHz FSB version, have a look at this month's Head-to-Head article). We used two 256MB sticks of Corsair XMS3200 for our dual channel tests and a single 512MB stick of Corsair XMS3200 for single

SYSMark2002



Q3A - CPU



□ KT400 ■ nForce2 dual channel ■ nForce2 single channel

channel tests. The results have been compared to an ABIT AT7 Max2, which is a KT400-based motherboard with a similar set of features.

NVIDIA has finally managed to deliver competitive performance from its chipset. In all the tests, the A7N-8X manages to perform right at the level of the AT7 Max2. The results also provide a more telling perspective on the performance of the dual channel DDR controller.

Unfortunately at the time of writing, there still weren't any IGP variants of the chipset stable enough for us to test. However, we can infer from the results of these tests and the performance of the original nForce that dual channel DDR will only make an impact when the integrated graphics is used, meaning that for SPP based boards, like the A7N-8X, a single stick of RAM will be more than sufficient.

ASUS has created a solid platform with the A7N-8X. From our tests it appears that the early performance problems and concerns about chipset bugs are no longer valid. nForce2 is finally here, and while it doesn't smack competing chipsets down in the performance stakes it manages to stay neck and neck with them. If you are looking for a fast, fully-featured motherboard for your Athlon, then the A7N-8X delivers.

SPECIFICATIONS

NVIDIA nForce2; SPP; MCP-T; DualDDR; two Ethernet ports; Dolby 5.1 audio; AGP 8x.

Website: ASUS www.asus.com

Supplier: CASSA www.cassa.com.au

Phone: CASSA (07) 5445 2992 Price: \$379

9/10

Ailean's DOMINATION² GAMES SYSTEM

What's with the llama?*

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Celeron 1.8GHz (socket 370)	\$179.00
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P4 2.0GHz (400MHz FSB)	\$345.00
P4 2.4GHz (533MHz FSB)	\$399.00
P4 2.53GHz (533MHz FSB)	\$509.00
P4 2.66GHz (533MHz FSB)	\$849.00
P4 2.8GHz (533MHz FSB)	\$949.00
P4 3.0GHz (533MHz FSB)	\$1359.00

AMD (incl. fan/heatsink & 3 Yr AMD warranty)	
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Duron 1300 MHz	\$119.00
XP 1800+	\$169.00
XP 1900+	\$199.00
XP 2000+	\$229.00
XP 2100+	\$275.00
XP 2200+	\$349.00

MOTHERBOARDS

ASUS - Socket 478	
P45333-VM	\$149.00
P45333-C	\$149.00

P4BGL-VM	\$169.00
P45333	\$219.00
P4B533-V	\$329.00
P4B533-VM	\$329.00
SOLTEK - Socket 478	
SL-85DRV4-C	\$159.00
SL-85MIV	\$159.00
SL-85MIR	\$222.00
SL-85MR2	\$229.00
SL-85ERV	\$219.00
SL-85DR2+	\$229.00
SL-85DR2+L RAID	\$239.00

ASUS - Socket A	
A7S333	\$160.00
A7V333	\$229.00
A7V333-RAID	\$269.00
A7V8X	\$299.00
A7M266-D	\$529.00
SOLTEK - Socket A	
SL-75KAV	\$139.00
SL-75DRV5	\$179.00
SL-75FRV	\$199.00

VIDEOCARDS

Triplex	
GF4 MX440 64MB	\$209.00

GF4 Ti4200 64MB	\$289.00
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Asus	
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V8420 Deluxe GF4 Ti4200	\$479.00
V8460 Ultra GF4 Ti4600 128MB	\$649.00

Powercolor	
SIS Xabre XP400 64MB	\$189.00
Radeon 7500 64MB	\$169.00
Radeon 9700 Pro 128MB	\$749.00

RAM

DDR	
128MB PC2100	\$66.00
256MB PC2100	\$120.00
256MB PC2700	\$131.00
256MB PC3200 (400MHz)	\$179.00

256MB PC2100 Corsair V-S	\$149.00
256MB PC2700 Corsair V-S	\$189.00
512MB PC2100	\$239.00
512MB PC2700	\$259.00
512MB PC2100 Corsair V-S	\$299.00
512MB PC2700 Corsair V-S	\$335.00
512MB PC3200 (400MHz)	\$319.00
512MB XMS-3000 Corsair	\$379.00
512MB XMS-3200 Corsair	\$389.00
1GB ECC Corsair	\$949.00
SD RAM	
128MB PC133	\$69.00
256MB PC133	\$89.00
512MB PC133	\$169.00
1024MB PC133 Corsair	\$799.00

HARD DRIVES

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36GB SCSI 15000 rpm	\$829.00
IBM	
40GB 7200rpm	\$159.00

60GB 7200rpm	\$185.00
80GB 7200rpm	\$215.00
120GB 7200rpm	\$379.00

SOUNDCARDS

Creative	
SB Live 5.1 SE DE	\$69.00
SB Audigy DE	\$179.00
SB Audigy Platinum	\$389.00
SB Audigy Platinum EX	\$449.00

CD-RW, DVD

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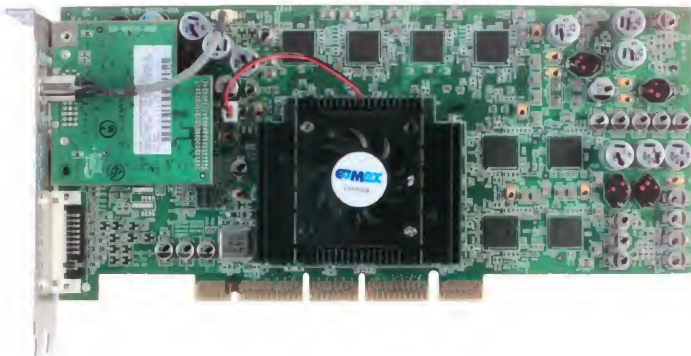
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ATI FIRE GL X1

Bennett Ring finds that X really does mark the spot for pro 3D graphics.



In last month's *Atomic* we had a look at the top four professional 3D cards, covering the 3DLabs Wildcat VP870, NVIDIA Quadro4 750 and 900 XGL, and finally the ATI FIRE GL 8800. Of these, the Quadro4 900XGL had the fastest performance, however, waiting in the wings was ATI's new FIRE GL X1 – and we managed to get our hands on the first engineering sample available here in Australia. Unfortunately, at the last minute, we had to pull the results at the request of ATI Germany, due to immature driver support. We promised you that you'd see what this baby can do, and ATI has finally given us permission, so here's the review you've all been waiting for. And yes, it was just as fast as we had anticipated.

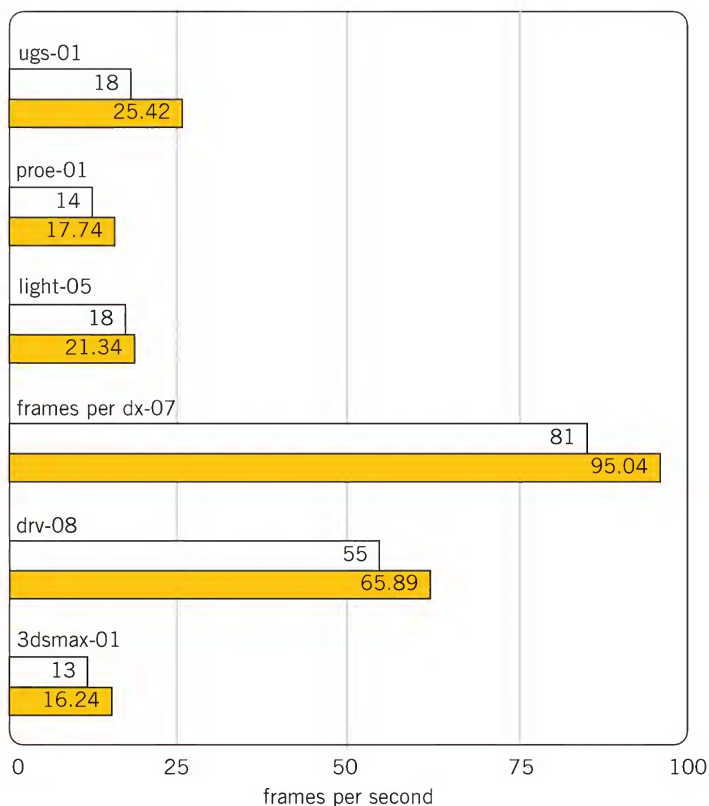
The new FIRE GL X1 is based on the same R300 chipset found in ATI's 'kickin' arse and taking numbers' consumer level RADEON 9700 video card.

According to ATI, other than an extra 128MB of memory that brings the total memory on the X1 up to 256MB, the only differences between the consumer 9700 and the X1 are: optimisation for superior OpenGL performance; ISV optimisation for greater stability; double buffer overlay support; OpenGL extensions and the ability to manipulate files in the millions of polygons. The other significant difference is the video in and out connections on the X1. Instead of the 15-pin D-Sub and DVI-out that can be found on the 9700, the X1 ships with two DVI outputs, as well as a stereo graphics connection.

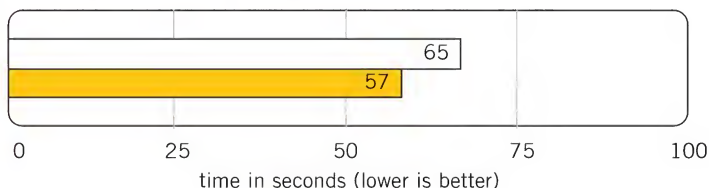
To test the X1, we relied upon the same benchmarks that were used in the professional 3D roundup last month: SPECviewperf v7.0 and 3ds max 5. We ran the same custom house scene that was developed by our 3D rendering dude, Ivon Smith. This scene is a nice mix of textures and polygons, reflecting real world usage for this video card. A dual 2.8GHz Xeon system with 1GB of RDRAM served as the testbench for this system, which was kindly supplied by Xenon systems (www.xenon.com.au). Windows 2000 with Service Pack 2 was our OS of choice, and the latest beta version of DirectX 9.0 was also installed. We wouldn't usually run a beta version of DirectX, but ATI requested that we run with DX9, as the X1 was designed with this API in mind. The overall performance winner from last month's roundup, the Quadro4 900XGL, was re-tested on this new platform to provide us with a comparison.

As you can see from the benchmark graphs, the X1 beat the Quadro in every single test. Its greatest lead was in the ugs-01 test within SPECviewperf, with a very impressive performance increase of 41% over the Quadro. When all of the SPECviewperf results were averaged, the X1 dominated the tests by a whopping 26%. The 3ds max 5 results weren't quite as impressive, but the X1 still beat the Quadro by a margin of 14%. These results are quite convincing for

SPECviewperf V7.0



3ds max 5 (custom house scene camera fly-by)



□ Quadro4 XGL 900 ■ FIRE GL X1

the X1, but it must be remembered that the Quadro4 750XGL (which is a thousand dollars cheaper than both the 900XGL and the X1), performed very closely to the 900XGL in last month's roundup. So if you can handle a 25% or so decrease in performance from the X1, the 750XGL still looks to be the best buy for those without bottomless piggy banks.

The situation in the professional 3D realm is now starting to look much like the consumer level climate. NVIDIA seems to have lost its grasp, if only momentarily, on the performance crown, and ATI has been more than happy to take it instead.

SPECIFICATIONS

256MB DDR-RAM with 256-bit DDR interface; R300 processor; AGP 8x.

Website: ATI www.ati.com

Supplier: Xenon www.xenon.com.au

Phone: Xenon 1300 888 030 Price: \$2,595

8.5/10

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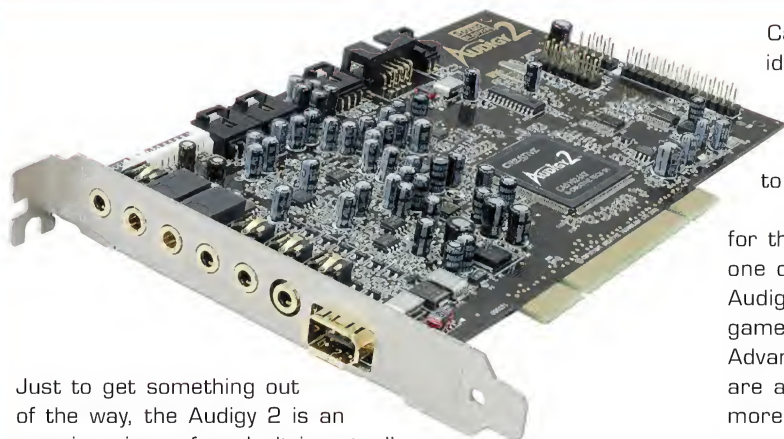
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Sound Blaster Audigy 2

Simon Peppercorn sounds off over the second outing of the Audigy chip.



Just to get something out of the way, the Audigy 2 is an amazing piece of work. It is actually the 9th generation of the Sound Blaster series, and although not remarkably different physically to the original Audigy, there are some notable changes and additions that could set this apart from anything Creative has previously offered.

By using higher quality DACs (digital-to-analog converters) than those found on the original Audigy, many additional features are made possible. For example, this is first time Creative has given us the ability to record in 24-bit/96 kHz (the original Audigy only allowed recording at in 16-bit/48 kHz).

The Audigy 2 also is currently the only PC audio device that enables advanced resolution DVD-Audio stereo playback in all its 24-bit/192kHz glory, and 24-bit/96kHz in 5.1. At present, however, DVD-Audio requires a second generation DVD-ROM, and Windows 2000 with SP 3 or XP with SP 1, so many will not see any benefit from this feature.

Relying on the CS4382 chip from Cirrus Logic, this card is now capable of delivering an impressive SNR (signal-to-noise ratio) of 106dB. It should be pointed out that the SNR has little to do with sound quality. It is actually a measure of signal strength, relative to background noise, measured in decibels. To you and I, the higher the number, the better the components used.

The Audigy 2 is capable of decoding both Dolby 5.1 and 6.1 signals. This doesn't really affect the Dolby mix so much as just adding a rear channel to the surround sound. In fact, it remains one of the few sound cards that actually performs Dolby decoding and doesn't just rely on a bundled software DVD player to manage the Dolby decoding process.

This is also the first sound card to be THX certified. To achieve that certification, the Audigy 2 was required to comply with stringent performance standards for audio quality and its processing components. There are two flavours of THX certification, THX and THX Ultra. They are both supposed to deliver the same standards of home cinema sound quality, but the Ultra is for larger environments of 2,000 to 3,000 cubic feet. For most of us, the vanilla THX will be more than ample.

Creative has released two versions of the Audigy 2, the standard and the Platinum, with the difference being the addition of the internal drive bay; optical output and a second IEEE 1394 port for the Platinum; as well as slightly different software bundles.

Carried over from the original Audigy is the practically identical internal drive bay (for Platinum editions); the almost redundant joystick port, located on a separate bracket; and the same collection of EAX effects. Also still present is the annoying problem of being unable to record through the line-in without playback monitoring.

As with its predecessor, the Audigy 2 includes support for the increasingly popular EAX Advanced HD technology, one of the few gaming focused sound APIs left. The original Audigy launched with support for this, but there were no games on the market that supported it. Now that the EAX Advanced HD technology has been out for over a year, there are a host of games with support on the market and many more in the pipeline. Creative has always had a strong commitment to gaming and the Audigy 2 is no exception.

As you are all audio experts, you understand that the audio quality of any sound card is affected by both the software and the hardware involved in delivering that sound. To hear obvious differences in sound quality between the Audigy and Audigy 2, you would definitely need a high quality set of speakers. However, on 2.1, and even budget speakers, the sound output was noticeably improved. When pumped through the new Logitech Z-680 speaker set reviewed in this issue, the change in sound quality was noticeably more apparent.

To test this card, we started with a few MP3s encoded at 192Kb/s. The sound was every bit as impressive as we had expected, with the mid-to-upper tones being crisp and clear but not harsh, and the bass warm and thick, without being muddy. Separation was excellent and no 'flatness' in the sound was evident.

We then moved on to a few DVD titles. Action sequences in *Behind Enemy Lines* and of course, *The Matrix*, demonstrated the benefits of good hardware Dolby support and really showed off the cards surround capabilities. A couple of rounds of UT2003 were the icing on the cake. EAX sound effects were more than convincing and again, the surround sound shone through. However, we expected as much from a card of this pedigree. Anything less would have warranted cause for concern.

Is there enough here to warrant existing Audigy owners to upgrade? Yes, it is packed with features and it's the best card yet from Creative, with seriously impressive performance and benefits. But it could be better described as an Audigy 1.1. It feels more like what the original Audigy could have (and should have) been.

Creative continue to move ahead, setting new standards in PC sound; but this is not a quantum leap from previous offerings. That said, if you looking at replacing your ageing sound device for something with a high level of functionality, then this is the card for you.

SPECIFICATIONS

Dolby 5.1/6.1 decoding; EAX Advanced HD; THX certified.

Website: Creative Labs <http://australia.creative.com>

Supplier: SoundBlaster.com www.soundblaster.com

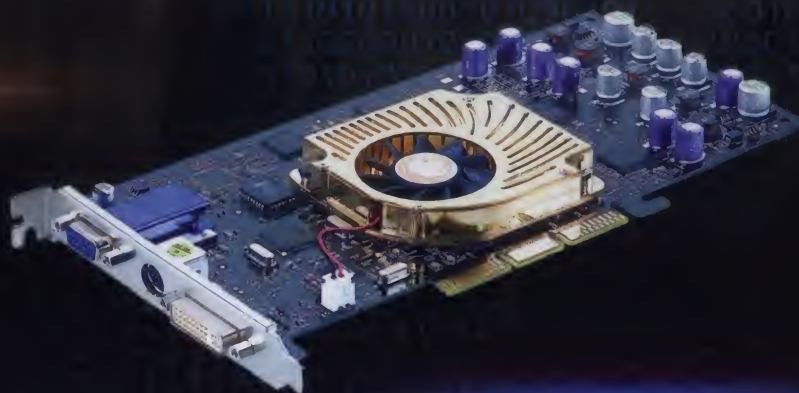
Phone: Creative Labs (02) 9666 6100 **Price:** \$549.00 for the Platinum and \$299.00 for the standard version.

8/10

VideoMate Cinema

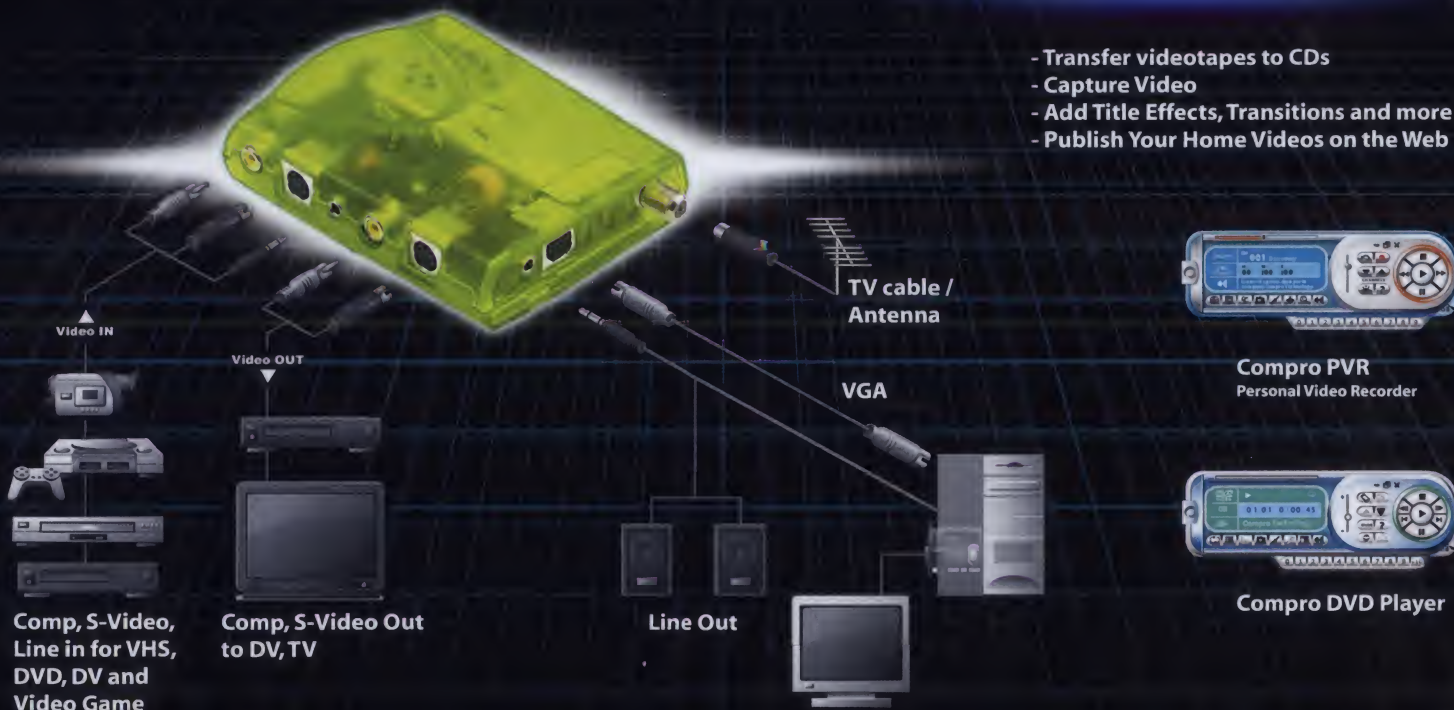
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- * nfiniteFX II Engine



- * NVIDIA GeForce™ 4 MX 440 / MX 420 GPU
- * 64MB DDR Memory
- * Video In / Video Out
- * Accuvue Antialiasing

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Oakleigh
VIC 3166
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Fax : 03 9563 2659

Dell Inspiron 8200

Jump onto the leading edge of the notebook speed curve with John Gillooly.



Welcome to the next generation of desktop replacement notebooks. Until now it has been impossible to purchase a notebook with fully DirectX 8-compliant graphics, a situation that has changed thanks to ATI and the launch of its MOBILITY RADEON 9000.

The most powerful mobile graphics chip to this point has been NVIDIA's GeForce4 MX 440 Go, which delivered fairly stunning performance but – like its desktop brethren – was nothing more than a faster version of the GeForce2 with some minor architectural additions. ATI has responded by launching the first chip to bring hardware pixel and vertex shaders to the mobile space with the MOBILITY RADEON 9000.

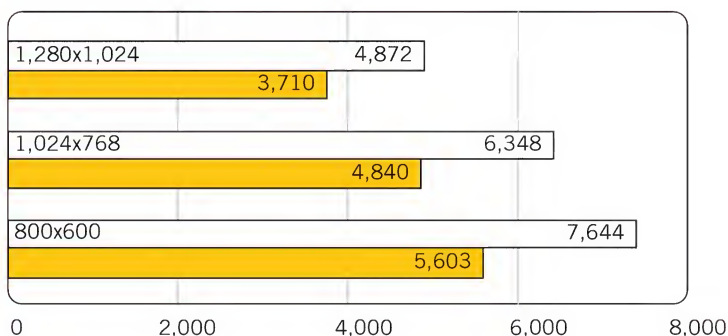
To complement the 64MB MOBILITY RADEON 9000 chip, Dell has packed it into its top-of-the-line Inspiron 8200 series alongside a 2GHz Pentium 4-M processor and 512MB of PC2100 DDR-RAM. This equates to a performance notebook that has little competition. The Inspiron 8200 that we tested also featured a 40GB HDD, DVD/CD-RW drive and a 15in UXGA screen as well as plenty of ports and slots for your plugging amusement.

The final product is a relatively large notebook, so while it's definitely not a great weapon for the road warrior, it's capable of taking it to your average desktop PC despite being a fraction of the size. The 15in UXGA screen is crisp, clear and good for gaming. The viewing angle is excellent, with the screen perfectly visible from all angles.

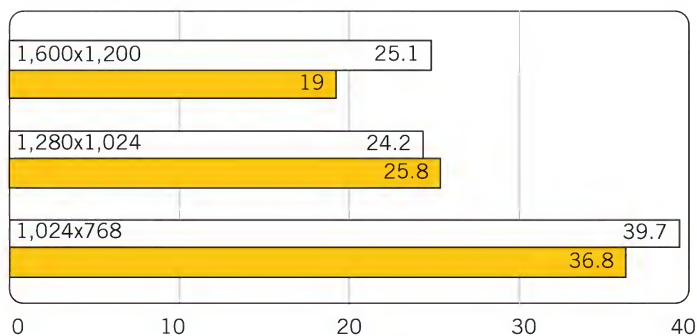
The inclusion of both a touchpad and a trackpoint controller for mouse replacement will please some people, but dealing with so much bolted onto the front of the notebook can become annoying at times. However, anyone wanting to use the Inspiron 8200 for gaming will undoubtedly abandon these controllers altogether and make good use of the USB ports by plugging in a mouse or joystick.

We compared the performance of this 2GHz P4-M / RADEON 9000 Inspiron 8200 with an older 1.7GHz P4-M / GeForce4 MX 440 Go-based model.

3DMark2001 Pro



Serious Sam SE Cooperative demo



□ Inspiron 8200/ RADEON 9000 ■ Inspiron 8200/ GF4 Go

We tested with 3DMark2001SE Pro and the Serious Sam: SE cooperative demo.

In 3DMark2001SE the scores were nothing short of stunning for a notebook, with a whopping 6,348 3DMarks at 1,024x768, almost 25% faster than the 1.7GHz/GeForce4 MX 440 Go variant of the Inspiron 8200. Scores under OpenGL in Serious Sam: SE are much closer between the two, but the 3DMark scores show the advantage of having DirectX 8-compliant hardware inside the notebook.

It is not just gaming that is enhanced by the MOBILITY RADEON 9000, as it also features ATI's integrated MPEG-2 decoding and FULLSTREAM video de-blocking technology, as well as optimised power management for both gaming and DVD viewing on the built-in DVD/CDRW combo drive.

Ever since the launch of the Pentium 4-M CPU, notebooks have been getting closer and closer in performance to leading edge desktop systems. These 'desktop replacements' are not what everyone looks at in terms of notebooks; they are relatively large and heavy. However as long as you aren't carting the notebook around constantly it pales into insignificance when compared to the weight of a similarly powered desktop system. □

SPECIFICATIONS

2GHz Pentium 4-M; 64MB MOBILITY RADEON 9000; 512MB DDR-RAM; DVD/CD-RW drive; 15in Ultrasharp UXGA TFT.

Website: Dell www.dell.com.au

Supplier: Dell www.dell.com.au

Phone: Dell 1800 812 393 Price: \$4,298

9.5/10

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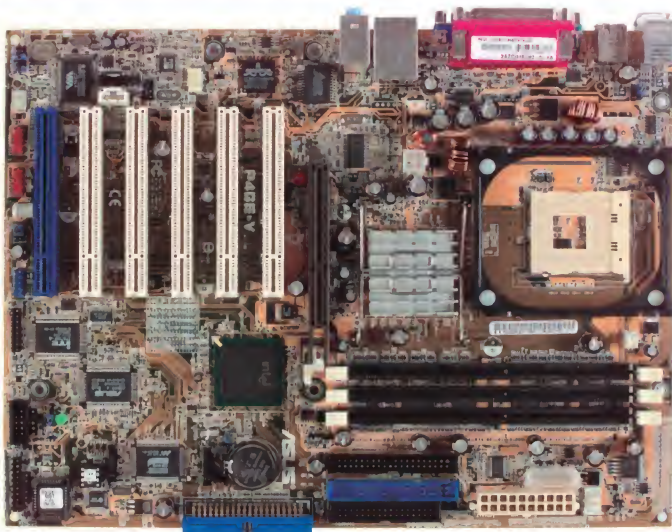
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Windows is a registered trademark of Microsoft Corporation.

ASUS P4GE-V

ASUS' new 'GE'-whiz mobo gets a once over from John Gillooly.



The previous incarnations of Intel's 845 series of chipsets, the i845E and i845G, were officially differentiated by the presence of integrated graphics in the i845G. In reality, the i845G became the chipset of choice for tweekers and overclockers because mobo manufacturers could squeeze a lot more out of the memory controller on the i845G than the i845E.

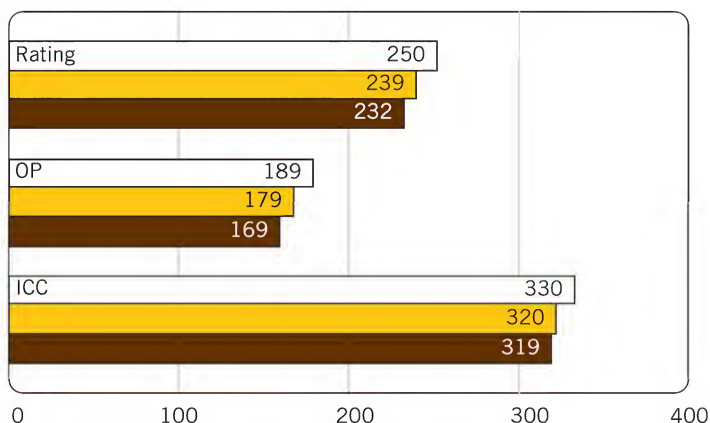
The major advantage of the i845G was that, while it only officially supported DDR266, through some clever trickery it could run DDR333, and do it better than competing solutions. Intel has now officially validated DDR333 and released an updated i845GE chipset. Besides DDR333 support, the i845GE also supports the next generation 3.06GHz and above P4 CPUs with HyperThreading – support that is lacking completely from the i845G chipset.

ASUS has used the i845GE as the basis of its P4GE-V motherboard. This board is laden with features, providing a very tempting solution for the Pentium 4. The three major features are headers for IEEE 1394, Serial ATA RAID via a Promise controller and Broadcom Gigabit Ethernet support. ASUS is one of two manufacturers who we have seen offering Gigabit Ethernet, and while this may not be a solution that the average user will take advantage of immediately (mainly due to the high cost of Gigabit switches), it is certainly a welcome offering for future use. Serial ATA RAID is also a technology that won't come into its own for some time yet, largely because Serial ATA drives are still a thing of fairytales, but it does widen the system upgrade path.

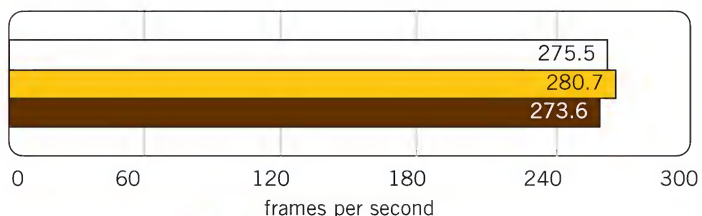
From our testing of the integrated graphics component of the i845G and i845GE chipsets we know that it is by no means a gaming solution, especially when compared to the integrated graphics cores offered by NVIDIA for the Athlon XP. While it is fine for most other tasks, the core is too slow to play modern 3D games at decent resolutions or detail levels. Keeping this in mind we focused our testing of the ASUS P4GE-V upon motherboard, rather than graphics, performance.

We tested the ASUS P4GE-V with a 2.4B GHz P4 and

SYSMARK2002



3DMARK2001 SE



☐ ASUS P4GE-V
 ☒ ASUS P4T533
 ☐ MSI 845PE Max2

512MB DDR333. The results have been compared to the ASUS P4T533 board, which uses RIMM4200 RDRAM and the i850E chipset, and the MSI 845PE Max2 board, which uses Intel's other recently released chipset, the i845PE.

As usual, we tweaked up the BIOS to the most aggressive settings we could. When in the BIOS of the P4GE-V, we noticed that the memory could be run at 266MHz, 333MHz and an overclocked 355MHz, so of course we tested with the memory running at 355MHz. Simply put, this board is an absolute screamer. In Quake 3, it was still slower than the P4T533 and on par with the MSI 845PE Max2. However, in SYSMARK2002 the P4GE-V screamed ahead of the other two boards, delivering the fastest performance that we have seen so far from our standard 2.4B GHz P4.

The P4GE-V is a beautifully balanced combination of features and performance. The integrated graphics is the most forgettable part of this board, but with an AGP slot integrated graphics pales into irrelevance anyway. Eminently tweakable and filled with luxuries like Gigabit Ethernet and Serial ATA, ASUS has again delivered one of the finest Pentium 4 boards on the market.

SPECIFICATIONS

Intel 845GE chipset; DDR333; Gigabit Ethernet; Serial ATA; IEEE 1394; USB 2.0; molex replacement for ATX12V plug.

Website: ASUS www.asus.com

Supplier: CASSA www.cassa.com.au

Phone: CASSA (07) 5445 2992 Price: \$439

9/10

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Sony CRXP90MU



Combination optical drives aren't exactly new – internal models have been around now for quite a few years.

However, it's only recently that we've started to see external, and therefore mobile, combination drives. The new Sony CRXP90MU, which we are

reviewing here, is a great example of such a drive.

Weighing less than 250 grams, the CRXP90MU is certainly portable. This light weight is due to a primarily plastic construction. Unfortunately, as a direct result of this, the drive feels very flimsy, to the point that carting it around inside a bag full of heavy gear wouldn't go down in history as a brilliant idea.

For such a titchy little drive, it has a bewildering range of functions. It can read standard CD-ROM disks at a maximum speed of 24x and DVD-ROMs at a maximum speed of 8x. If you get the burning urge, standard CD-Rs can be written to at a maximum speed of 24x, and you can even burn to a

CD-RW at up to 10x speeds. And yes, thanks to the wonders of all that is USB 2.0, the drive will actually hit these maximum speeds. We wanted to benchmark each of these functions using the popular Nero CD Speed to verify these speeds, however the utility failed to run – a common problem with external drives.

Buffer underrun protection is now standard on any drive worth more than the cost of a packet of peanuts, so it's no surprise that this drive uses Sony's PowerBurn underrun protection technology. A feature that we didn't expect, but certainly appreciate, is a single Sony Memory Stick bay on the front of the drive. Is there any device that Sony makes these days that doesn't have Memory Stick bay?

At \$699, this drive is priced quite competitively, especially when you consider the wide range of tasks that you can perform with this drive. Add up the cost of separate drives for each of its functions and you'll see what we mean. While we have concerns about its sturdiness, there's no denying that this is one tidy package with plenty of punch. □

SPECIFICATIONS

24x CD-ROM; 8x DVD-ROM; 24x CD-R; 10x CD-RW; USB2.0; 250g.

Website: Sony www.sony.com.au

Supplier: Sony www.sony.com.au

Phone: Sony 1300 13 7669 **Price:** \$699

8/10

WinFast 6X Sound



Leadtek has been around since the mid-1980s, and is well known for its WinFast range of video cards and TV tuner cards, but not as well known for its other products, such as motherboards,

video surveillance tools and GPS devices. It has now ventured forth into the sound card arena, and delivered the confusingly named 'WinFast 4X Sound' and '6X Sound' cards. We say confusing because the presumption was that, in the instance of the 6X Sound, it would be a 6.1 sound card. In fact it is a 5.1 channel device (ie. total of six channels).

Priced toward the budget-end of the sound card market, this device has no pretensions of competing with the Creative juggernaut. However, it still manages to deliver a very respectable performance, for what appears to be a fairly plain sound card. It comes with support for a wide range of standards and features,

including 24-bit S/PDIF IN and OUT connections; support for HRTF 3D positional audio, Microsoft's DirectSound 3D and Aureal's A3D interfaces. Also included is a DLS-based wavetable music synthesizer, with support for Microsoft DirectMusic; EAX and DSP; and even legacy support for SBPro. In other words, this card is able to hold its own in most situations.

No real surprises lay in store for us – installation was straightforward and painless, and the card comes with a simple suite of WinFast audio utilities. Performance was perfectly acceptable, although to be fair, it's hard to find a poor quality sound card for a hundred bucks. The card coped well when faced with a range of audio situations. MP3s encoded at 192Kb/s were delivered without any real problem, sounding as rich and detailed as we'd expected. Gaming was also handled comfortably, with reasonably convincing positional audio. Sounds across the audible spectrum were clear and free of distortion.

The bottom line is that this card is a good all-rounder, and will cope perfectly well with most things you throw at it. Although there are cheaper sound cards available, this one still represents good value for money. □

SPECIFICATIONS

5.1 channel; 24-bit S/PDIF IN/OUT; C3DX positional audio; supports MPU-401 interface.

Website: Rectron www.rectron.com.au

Supplier: Rectron www.rectron.com.au

Phone: Rectron (03) 9561 6166 **Price:** \$99

7/10

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Emagen Mini Q 450

John Gillooly thinks Emagen's mini-PC looks like something from Q's workshop.



There is something inherently cool about a computer the size of a shoebox, that can cut it with the big ATX systems that we all know and love. In the past, these systems have been based around the small mini-ATX form factor, but over the past year smaller systems have emerged to capture the hearts and minds of performance freaks.

It's great to see that the concept is moving beyond the pure barebones system and into the realm of pre-built systems like the Mini Q 450 from Emagen.

The idea of tiny PCs is not a new one; big volume manufacturers have been building small systems for a while, but they have always involved a compromise in performance, something that is not an issue with the Mini Q 450 system.

Emagen have started with a Mini Q 450 barebones system that is made by Taiwanese company Jetway. This system incorporates a shoebox-sized powder coated Aluminium case, SiS 651-based motherboard, 200W power supply, infrared remote control, and a small laptop-style keyboard and mouse. They have then stuffed it with a 2.4B GHz Pentium 4 CPU, 256MB of PC2700 DDR-RAM and a 64MB Triplex GeForce4 Ti4200. All this provides the basics to make the Mini Q 450 a respectable performer. Add to that an 80GB HDD and combination 16x DVD/32x10x40x CD-RW drive for storage and you have a mighty powerful little package.

Of course, there has to be some kind of trade-off to get the system into such a small package, and that trade-off is expandability. The Mini Q 450 has two DIMM, one PCI and one AGP slot, rather than the three or four DIMM and five or six PCI slots that a full-sized motherboard would have. This becomes less of an issue once you see what is integrated onto the board. It has USB 2.0, IEEE 1394, LAN, S/PDIF optical out.

The system also includes integrated SiS 315 video, but it simply doesn't hold a pixel in the performance stakes when compared with the very powerful GeForce4 Ti4200 that ships with the mini PC.

Unlike competing small form factor barebones unit, the

Mini Q 450 uses a standard Intel HSF for CPU cooling and a single exhaust fan to get the air out the back of the case. This initially caused us some concern that the system would be prone to overheating, but much to our delight our worries were unfounded. To test the cooling we ran the system under full CPU load for a day without a single crash. Put simply, this system is rock solid.

We also tested gaming and overall system performance – how could we not – and were pleasantly surprised to see the Mini Q 450 perform to the levels that we expected from this particular combination of CPU, RAM, video card and motherboard chipset.

After all, 9663 3DMarks at 1024x768 is a pretty respectable result and translates to a very decent and playable gaming experience across the vast majority of games currently available.

The particular system that we reviewed came with a 15in Samsung TFT and a full-size Mitsubishi keyboard. Thankfully these options and most of the other components are customisable on the Emagen website - for while the full-sized keyboard was a good idea, the TFT left a lot to be desired, with a maximum resolution of 1024x768 and very average image quality.

Besides being a decent gaming performer, small form factor PCs are also great options for home theatre set-ups. Thanks to the remote control bundled with the Mini Q 450, this system is no exception. We tested the remote with WinDVD as well as Windows Media Player's in-built DVD support and the remote coped admirably with the task.

Unfortunately the remote is let down in a few small areas. It communicates with an infrared sensor built into the front of the case, which restricts your placement of the PC in a home theatre situation, something that would be mitigated through the use of an RF transmitter. The button layout on the remote itself is fairly confusing and counterintuitive, and navigating using the built-in trackball is fiddly at best.

That said, there are several buttons that can be programmed to open programs or launch Websites, so there is potential for building a customised home theatre system around the Mini Q 450, but it would take a little extra work.

In the end, some of us will prefer to take the challenge of taking a barebones unit and customising it ourselves, while others will love the ease and convenience of a small form factor PC without the hassles of sourcing components and building and maintaining the system.

Emagen has provided a great option for people in the market for one of these pre-made barebones systems, while also delivering a degree of freedom to customise it to your specific requirements.

SPECIFICATIONS

2.4B GHz P4; 256MB DDR333; 64MB Triplex GF4 Ti4200; DVD/CD-RW combo drive; 80GB HDD; 15in TFT.

Website: Emagen www.emagen.com.au

Supplier: Emagen www.emagen.com.au

Phone: Emagen 1300 880 070 Price: \$2,699

8.5/10



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Perspex case



Perspex windows are cool. Unless you're blessed with X-ray vision, there's no better way to view the expensive components you just sold your first born's soul for. And if you did happen to have X-ray-enabled eye balls, you'd probably be too busy staring at the cute attendant at your local video shop to even bother playing on your PC. Now that Perspex

windows are becoming quite

commonplace among PC enthusiasts, someone just had to take the window craze up a notch to the insano level.

When we first received this case it was a motley collection of screws, large Perspex slabs and a handy pair of cotton gloves. We're pretty sure it would be illegal to sell these cases already built, due to Australia's tight EMF emission laws, hence its arrival in an unformed state. Some simple instructions led us through the construction phase with nary a hitch, although the diagrams could have been a little clearer. Somehow we managed to end up with four or five bags of small components left over at the completion of the construction, with a couple of these having

no obvious use within the case. Weird. Once it was built, the case drew an astounding number of comments from passers-by, with even non-geeks having to quickly place a book/sheet of paper/other object of concealment in front of their crotch to hide the, erm, rising excitement after first seeing this beauty. And we hadn't even put a single component into it.

While the case was undeniably attractive, it wasn't without its problems: the pre-drilled holes for the speaker mount were grouped too close together, making it impossible to mount the speaker without drilling new holes; and the fact that this case is all Perspex means that it is going to get dirty incredibly quickly – you just need to touch it with an unprotected finger to leave a smookey fingerprint. It also has five pre-cut fan holes, so if you don't want to fill these you're going to have to put up with them anyway. Finally, for what it is, that being a wad of pre-cut plastic with a few screws and no power supply, this baby ain't cheap. But at the end of the day, if you want a unique case and don't have any industrial plastic cutting skills [don't we all?], this case will truly stand out from the rest of the crowd.

SPECIFICATIONS

Four 5.25in, two 3.5in and five 3.5in HDD bays. Dimensions: 445mm x 220mm x 475mm (H/W/D). Weight: 7kg (case only).

Website: www.anyware.com.au

Supplier: Anyware www.anyware.com.au

Phone: Anyware (02) 9879 5788 **Price:** \$265

8/10

Juzt-Reboot WOL-NT

For system administrators, nothing in life is as unenjoyable as having to spend hours fixing a problem created by someone changing a setting, installing a program or deleting a file. Many times these little changes go unnoticed, steadily building from tiny insignificance to



towering hulks of job-threatening malevolence. And, all things being equal, it's usually upon reaching this point of career and sanity-ending

significance that they choose to reveal themselves.

Thousands upon thousands of screaming users flow like ants out of their cubicles and across the barren, barbwire-strewn area outside your office, united by a single goal: spilling the blood of SysAdmin and thus appeasing the email and network Gods. Thankfully, there are ways you, as system administrator, can avoid this dire fate.

Atomic reviewed a Juzt-Reboot card, the PCI-NT, way back in *issue 19*. The main difference between that card and the WOL-NT is that the latter doubles as a network card, therefore saving you a PCI slot. For consistency, *Atomic* tested the Juzt-Reboot WOL-NT card in the same way we tested PCI-NT. After disabling Windows File Protection and setting up the PCI card for maximum protection, we began our battery of tests.

Deletion of files came first. We removed several files and directories, including vital OS files from the SYSTEM and SYSTEM32 directories. Juzt-Reboot performed admirably, restoring each file upon reboot.

Next up were viruses. Once again we fired a selection of viruses into the system (after disconnecting it from our network!), only to find that Juzt-Reboot would restore the affected files flawlessly after boot. Once we'd finished with viruses, we tried formatting via tools included on the Windows XP CD. Juzt-Reboot had other things in mind however, and bypassed the BIOS boot order to force a boot from C:\.

Finally, we attempted something a little more devious: hex-editing. We took a file, changed two values, saved and rebooted. Upon opening the same file again, we were pleased to see the original values restored.

For system and IT admins looking for a way to keep their systems in a single known state, the Juzt-Reboot WOL-NT could be what you're after. The fact that it's also a 10/100 WOL LAN card, with the capability to fetch and send Juzt-Reboot settings via the network, makes it look even better.

SPECIFICATIONS

10/100 Wake On LAN PCI Ethernet card; instant restoration of Windows systems; backup restoration compatible with all x86 OSes.

Website: www.juzt-reboot.com

Supplier: ADO Electronic www.ado.com.au

Phone: ADO (02) 9417 5233 **Price:** \$199

8.5/10

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This network is tied to the bulletin board or forum system called ozforums.com where 15,000 registered members post news, chat and make friends everyday. OzForces Internet is a locally owned company started by a group of gaming enthusiasts who know the games and the culture surrounding them. To check out the plans and their instant online signups visit their website at www.ozforces.com or call them on the nation wide number 1300 134 081.

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JNC SSF-9



In the Australian market, JNC is about as well known as the Giant Japanese Spider Crab's mating habits, but a strong lineup of

feature-packed MP3 players is beginning to change this. Over the last few months we've seen several JNC players with all the features of the rest of the pack jammed into tiny packages and at half the price we'd expect. The SSF-9 is the latest in JNC's astounding lineup, and brings more features than we've ever seen before, yet it's priced low enough that your wallet won't have a cardiac arrest.

As well as the standard MP3 player capabilities, which include 128MB of memory and the ability to play MP3 and WMA files, this gadget also acts as a voice recorder and FM radio tuner. Thanks to the large amount of memory, you can record up to nine hours of voice, either straight from the FM tuner or the built in microphone, and then email it via your PC using the included voice management software. The quality of this recorder is superb, remaining crystal clear even when the device is several feet away from the person speaking.

A surprising omission on most MP3 players is a radio tuner, but JNC didn't skimp in this department. A digital FM radio is included, however this suffers from the same problem most Walkman-sized radios are plagued by: it's fine when you're not

moving, but once you get on the bus or train continual fine tuning is necessary, unless you enjoy loud hissing noises – in which case you should probably become a snake handler.

JNC's own media uploader is included with zero Digital Rights Management protection to confuse the user. Just the way we like it. It's also one of the easiest uploading applications we've seen, just as all uploaders should be. Take note Sony.

The most important thing to consider when evaluating an MP3 player is its sound quality. As much as we like to lay the steel cap into unworthy products, the sound quality of this player can't be faulted. The only complaint, and it's not much of one, is that it isn't quite as loud as the iPod or Intel Pocket Concert. Unless you've destroyed your eardrums at a few dozen raves, you probably won't even notice the slightly lower volume.

Just like the other JNC products *Atomic* has reviewed, one of the most remarkable features of this player is its low price. At \$429 for a 128MB player with voice recording and FM radio, the SSF-9 is quite simply a steal. A very worthy candidate for your listening pleasure.

SPECIFICATIONS

128MB; USB download cable; one AAA battery provides seven hours of playback.

Website: JNC Digital www.jnc-digital.com.au

Supplier: JNC Digital www.jnc-digital.com.au

Phone: JNC Digital (02) 9264 0977 **Price:** \$429

9/10

Skyhawk Jupiter



Now that designer PC cases are more common than a \$5 polish and spit job in Kings Cross, it takes more than a bit of Perspex slapped into the side to get our attention. While we haven't been particularly impressed with Skyhawk efforts in the past, the Jupiter had so many cool features that we just had to tell you about it.

Yes, this case does have a Perspex window. No, it is not

like any Perspex window we've ever seen pre-installed into a case before. Instead of a simple square window that even a six-year-old Afghani steel worker could cut, the window in this case is quite intricate. Mounted smack bang in the middle of this window is an 80mm case fan with its own duct. This fan duct is constructed of quite flimsy plastic, but it does the job, redirecting fresh air towards the CPU.

The rest of the case is constructed of Aluminium alloy, and as a result the case weighs next to nothing. A layer of the same light blue Perspex used in the side window adorns the

front of the case, giving it a unique look. Also mounted on the front of the case is a multimedia port, with two USB and two FireWire ports, as well as 3.5mm headphone and microphone jacks. A pass through cable is provided for these.

If you take a look at the product photo, you'll see what looks like a clock mounted at the bottom of the front. And that's what it is, but thankfully that's not all it does. You can monitor the temperature from a single temperature probe or display hard drive activity via this LCD screen. The overall build quality of the case is excellent, with rounded edges throughout and a sturdy feel that implies it can handle a reasonable knockabout.

The case can be bought in one of two packages: a standard pack for \$220 that only includes the case and side fan, or the fully sick mate deluxe kit, which ships with a neon, a couple of rounded IDE cables and an additional neon fan for \$310. Neither of these kits includes a PSU.

The \$310 kit seems a little expensive for what you're actually getting, but the standard kit offers a great looking case at a nice price.

SPECIFICATIONS

LCD/Light module; Perspex window with side fan; all Aluminium construction.

Website: Skyhawk www.skyhawkgroup.com

Supplier: Below-0 www.below-0.net

Phone: Below-0 (07) 3348 2155 **Price:** \$220 for standard kit

8/10

Terrorists - Beware!

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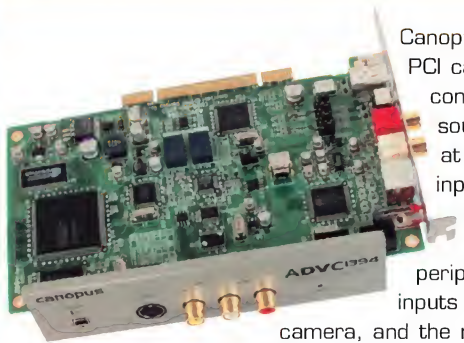


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Canopus ADVC-1394



Canopus' home user-priced PCI card can capture and convert almost any video source you can throw at it, with DV input/output for your digital video, IEEE-1394 for compatible peripherals, Composite inputs for your VCR or camera, and the man-on-the-budget's

Component signal, S-Video, for that extra ounce of quality.

This card boasts a lot of new features and it's the first capture card with Open Host Controller Interface (OHCI) technology. This means there are no drivers to install and no fussy codecs, because it's all on-board. Notch one up for simplicity. Bundled software includes WinProducer and Video Vegas, which at least provide essential means of capturing, editing and outputting to any number of formats including DVD.

Installation consisted of nonchalantly dropping the card into a vacant PCI slot and booting up. Canopus recommends after installation jumping straight to recording, so that's what we did, with some high-contrast, colourful and very energetic concert footage. The device used for playback was DV so the quality in the DV capture test was perfect. But using the same device for an analog playback and capture provided amazing results. Not

only was the footage almost identical in quality, with only unavoidable limitations of the composite signal visible, but also perfectly in sync.

Analog capture is notorious for dropping sync after five minutes or so, but living up to Canopus' claims of seamless analog capture the DV input achieved the expected 25fps average during a 20 minute capture, while the analog scored an outstanding 24.96fps average. Usually after ten minutes our live band would be pulling a bad case of the Milli Vanillis.

Unfortunately output is DV only but this card is made for those who need to work with older source footage before making the move to pure digital. Accessories such as the five-inch Front Bay make life easy on feeble editor knees, and its lush brushed Aluminium face in our beige test-box looked like a gleaming gold tooth in a hobo's smile. But for the extra \$199 it may not be worth saving your kneecaps.

For discerning home-editors and pros with lots of tape footage that needs converting quickly without fuss, the ADVC-1394 comes highly recommended. □

SPECIFICATIONS

IEEE-1394 and DV inputs/outputs; Composite and S-Video inputs; PAL and NTSC compatible; software included.

Website: www.canopus-aust.com

Supplier: Canopus Australia www.canopus-aust.com

Phone: Canopus (03) 9886 9111 **Price:** \$599

8.5/10

Logitech Z-680 5.1 speakers



Pardon us while we rave a bit,

but these new speakers from Logitech are edging on the best we've ever been blessed with reviewing. An upgrade from the Z-640, this system is as pretty as it sounds.

The first thing we noticed was the new and dead sexy control unit, with a cool blue LCD screen, that fully manages the speaker settings. The levels for master volume, subwoofer, centre and surround are there, as well as various settings such as stereo, stereo X2, and 6-channel direct Dolby Pro Logic II. Dolby Pro Logic II allows for the production of 5.1-channel sound from older Dolby sound sources, which only produce 4.0 channels of sound. Two Prologic II modes: 'Music' and 'Movies', create a sound field optimised for different listening situations.

Also present in this control unit are settings for front and rear dimensions, surround delay, center width and so on. The control unit allows you to select from the different possible input

types, optical, coax and direct. A headphone socket is present, as well as a line out. The subwoofer has been improved by an 8in, long-throw driver with a flared bass port on the left. By removing much of the components from the subwoofer to the control unit, there is more room for the larger, 450W amplifier that will generate less heat. The satellites remain unchanged, but do sound a whole lot sweeter.

The Z-680 speakers feature Dolby Digital and DTS hardware decoding, as well as being THX certified. Watching Star Wars: Episode One through these speakers at not-too-socially-acceptable levels was astounding; the bass was rich and pumping without being intrusive. This is an improvement on previous subwoofers in the Z series, which although responsive, tended to be overbearing. Mid-to-high tones were equally impressive. UT2003 was a sphincter-puckering experience. The bass rumbled right through our bodies, but took nothing away from the clarity of every little background sound and EAX effect.

At \$899, it's priced at the high end of the PC speaker system market. We would give this system a perfect score, but as loud as loud is, the dial doesn't go all the way to eleven. □

SPECIFICATIONS

Total power output 450W RMS; Satellites total 265W RMS; Subwoofer 185W RMS; MAX SPL: 114 dB; SNR: >100 dB

Website: Logitech www.logitech.com

Supplier: Logitech www.logitech.com

Phone: Logitech (02) 9972 3711 **Price:** \$899

9.5/10





AD77

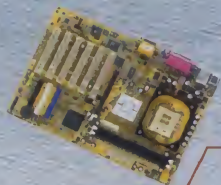
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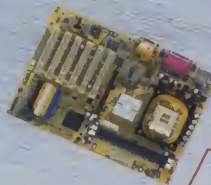
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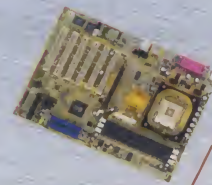
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Toshiba Portégé 3500

John Gillooly thinks Toshiba's new Tablet is more Decepticon than desktop.



It's crazy but it just might work. Microsoft's latest version of

Windows XP signals the endpoint of long term development in conjunction with hardware manufacturers for a new form factor for mobile PCs, dubbed Tablets. Comfortable with sitting on the cutting edge of portable PC design, Toshiba has taken the Tablet concept and created the new Portégé 3500, a fusion between a notebook PC and one of these new Tablets.

It's more than just a giant PDA: the Tablet concept comprises a 10in screen with a built-in active digitiser and enough grunt to run Windows XP Professional – as Microsoft's new Windows XP Tablet Edition (which is only available with a Tablet PC) is essentially XP Pro with custom additions that revolve around the active digitiser. It's this digitiser that differentiates the Tablet form factor from the myriad of other portable solutions.

Active digitisers work by using a magnetic coil in the pen that comes with each Tablet PC: behind the screen is a sensor layer that can track movement of the magnetic coil contained in the pen. This coil allows the pen to be used like a mouse, as it can be tracked without actually contacting the screen. When the pen contacts the screen it functions like a normal pen, writing on the screen. Hold the pen in one place for a few seconds and it opens the right click menu (the pen also has a button for right click), allowing easy keyboard and mouse-free navigation, as well as onscreen writing in the most natural way. As this isn't a normal static touch screen, you can rest your hand on the screen without worrying whether the Pentium 4's branch prediction unit will self implode trying to convert the smudge made by your palm to text.

Coupled with the digitiser are some funky additions to Windows XP – perhaps the most pervasive of these is the new '.ink' file format. This is a vector format designed to save your pen strokes as curves rather than images, allowing for volumes of handwritten text to occupy the minimum amount of drive space. The majority of work is done by Microsoft's new Journal program, which turns a multi-thousand dollar Tablet PC into a perfect replica of a 99c paper notepad. There are also

extensions to Office XP to allow pen use and a funky new game called Inkball.

There are two major types of Tablet PC design: 'pure tablets', which are keyboard-less screens with the guts built into a solid housing; and 'convertible tablets', which are essentially notebook computers that transform into tablets through a nifty rotating screen.

Toshiba's Portégé 3500 is one of the convertible designs, and will provide a good transition for those comfortable with notebooks but looking at trying this new Tablet craze.


Like all Toshiba notebooks, the Portégé 3500 employs some seriously funky and unique features to differentiate it from the rabble. Central to this is the screen-mounting hinge, which is made from magnesium-coated stainless steel for maximum durability, and allows for hassle-free transforming of the notebook into a tablet and back again.

The display uses a Wacom active digitiser, one of the two major types of digitisers used in Tablets. The advantage of the Wacom model is that the pen does not require any batteries to function, so while it slightly increases power drain on the Tablet, it saves you from having to worry about another set of batteries running out at inopportune times.

Under the keyboard sits a 1.33GHz Tualatin cored Pentium III-M CPU, with a 40GB HDD and 256MB of RAM, 16MB of which is dedicated to the integrated Trident Cyberblade graphics core. The Portégé 3500 lacks an optical drive, but it has slots for PCMCIA Type 1, Secure Digital and CompactFlash media, as well as two USB ports, RJ45 Ethernet, Wi-Fi and D-Sub VGA-out.

The lack of an optical drive is somewhat disappointing, though understandable considering the philosophy behind the Tablet PC. One could imagine that a built-in DVD drive would be great for watching DVD movies on the road, using the relatively large screen of the Tablet PC. Of course, the USB ports mean that you can still connect an external drive, and you can still use any Windows XP-compatible software player to watch movies stored on the hard drive.

After playing with the Portégé 3500 for a while the power of the Tablet concept becomes apparent: the pen is incredibly intuitive, with most tasks easily done via functionality in Windows XP Tablet Edition, or through the bundled symbol recognition software, allowing you to control the Tablet in a similar way to the gesture control system used to spank your monkey in the game Black and White.

Toshiba has combined a host of functions into the Portégé 3500 to provide a nice transition between notebooks and Tablet PCs without sacrificing performance or functionality. 

SPECIFICATIONS

1.33GHz Pentium III-M; 256MB SDRAM; 40GB HDD;
Wacom active digitiser; Microsoft Windows XP Tablet Edition.
Website: Toshiba www.isd.toshiba.com.au
Supplier: Toshiba www.isd.toshiba.com.au
Phone: Toshiba 1800 021 100 **Price:** \$4,840

9/10



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Colin McR

colin mcræ rally **3**

atomic | reviews | 02 | colin mcræ rally **3**

GAMES

Console-ation prize

The Xmas spend-fest means console makers are full of excitement pending the console war outcome. John Gillooly wonders what that outcome will actually be.



It's funny when you look back. Only a year ago, the death knell for the PC rang out from a toy store in New York as Microsoft launched the Xbox on an unsuspecting world. Well, at least that is what the word on the street was at the time. Of course, anyone with an ounce of sense knew that this was the biggest load of crap since Atari put its corporate reputation behind the Jaguar.

While the PC is still going strong, all the console platforms have now had at least a year to flex their muscles in the global marketplace, and the pattern that has emerged is unsurprising. After Sony's spectacular success in entering the console market with the original PlayStation, it has consolidated its position with the PlayStation 2. Of course, a big contributor to the PS2's success has been the year without competition it enjoyed before the Xbox and GameCube came on the scene.

The fight for second and third place in the console race is infinitely more interesting and much harder to call. Until a few months ago the answer would have been clearer cut, but now things have changed. In the Australian market at least, there were more Xboxes being sold than GameCubes up until recently. This has since become a lot closer, thanks to, in a big way, Nintendo finally getting an appearance from a little stereotypical Italian plumber called Mario.

You would have noticed the booklet strapped to the front cover of *Atomic*, packed with our impressions of the hottest games for Xmas. To arrive at the final line-up, Bennett and myself spent many, many nights and weekends playing countless games on every platform. Apart from the startling discovery that Bennett can repeatedly kick my butt in *Quantum Redshift*, and that I can return the favour in *Auto Modellista*, the big eye opener was not just the quality of games coming out, but the strengths and weaknesses of each console.

I'll say it now — the best looking games are on Xbox. Thanks in a large part to the extensive use of antialiasing and anisotropic filtering, Xbox games look incredibly slick. GameCube is looking surprisingly good for some games and average for others, which is a testament to developers squeezing the most that they can out of the ATI-built Flipper graphics chip (the Flipper chip does not even approach the power of NVIDIA's NV2A chip used in the Xbox). PS2 looks good, however it suffers from the same shimmering texture filtering problems that have plagued it since its launch.

Xbox also shines thanks to the inbuilt hard drive. After juggling save games around space starved memory cards on both the PS2 and GameCube, the ease and sheer volume of storage that the hard drive provides is a breath of fresh air. Sure, the hard drive contributes to the Xbox's chunkiness, but it is one innovation that makes the Xbox stand out from the rest.

Of course, you can have the best hardware in the world, but consoles are all about the games. PlayStation 2 has a big advantage here, as it's had a head start of over a year on the other two consoles and the quality of games coming out is getting better and better as developers wrap their heads around the difficult-to-program hardware. The Xmas line-up for PS2 is looking very nice indeed, with big name titles like *Kingdom Hearts* and *Grand Theft Auto: Vice City* set to engulf many a Xmas holiday.

The quality of Xbox titles only a year after launch is nothing short of outstanding. *Splinter Cell* is shaping up as the best looking game to be released on any platform to date, with gameplay to match, and the rest of the Xmas titles are delivering great gameplay over a wide range of genres.

GameCube is finally making an impact with some well-known franchises making their return. Nintendo's big strength has

always been with its ability to create long lasting characters that transcend the gaming arena, and we are seeing not only the return of Mario, but titles like *Starfox*, *Metroid* and *Legend of Zelda*, all making a return sometime soon. The 'Cube still has a lower number of available titles than the other platforms, but it is by no means out of the console race.

The next big battleground for the consoles will be online. There are two different models being adopted for this eventuality, and both have their strengths and weaknesses. Microsoft is creating its own multiplayer server farms and going for a subscription model with Xbox Live, something that may put people off when they realise they not only have to buy games but also pay a monthly fee. Sony and Nintendo are going the open online route, releasing networking hardware but not requiring a subscription, or hosting games on specialised server farms.

The path being walked by Sony and Nintendo closely follows the general trend with online multiplayer PC gaming, the same trend that has prematurely killed many a decent game and driven the online gaming scene into a Counter-Strike dominated, variety-poor shooting fest. With the PC model we usually see only a handful of games having any longevity.

Subscription based gaming like that being offered by Microsoft should mean that there will be support for games that would rapidly flounder and die in the dog-eat-dog free-for-all that is the open route. However, it all depends on the willingness for people to cop for broadband accounts, games and then an Xbox Live account on top of that.

It is a fine balance and completely untested (I am deliberately ignoring the Dreamcast and its 56K modem). Rather than the battle being over, as Sony would have everyone think, it is moving into a new, exciting and completely untested phase. The PS2 may have won round one, but round two is still wide open. □

Unreal Tournament 2003

Bennett Ring gets to abuse lots of people without getting punched in the mouth.



ABOVE: The Facing Worlds evolution continues



ABOVE: Inside the Face – ready for the match



ABOVE: Grab the flagpole and run like mad

Since first playing UT2003 I've developed a flawless system to judge how good a first person shooter is, based solely on the number of voice taunts you can abuse your opponents with. Sure, it's not backwards compatible with any other game ever released, but the fact UT2003 has at least 30 different taunts (not including orders or other tactical voice commands) proves it's the finest FPS ever. Provided you like Deathmatch, that is.

It also happens to have the most glorious graphics engine available on the PC, with a level of detail a hundred times higher than the previous UT graphics engine, but this pales into insignificance when you open the voice taunt menu for the first time. This amazing graphics engine, which has been sold to every man and his game developing dog for use in other titles, provides UT2003 with the most detailed environments ever seen on the PC, yet doesn't limit action to areas the size of a closet interior (*cough Doom III cough*).

These exorbitantly detailed levels are also populated with stunningly modeled characters, but unfortunately you'll be zooming past them so quickly that it's only when your legless torso is bleeding out in some dingy corner that you'll have time to appreciate this revolutionary graphics engine. Even on a mid-level system, such as a 1GHz CPU with GeForce2-level graphics card, the game runs smoothly enough to run with much of the eye candy enabled.

The fact this game also uses the amazing KARMA physics engine is way cool, but again

can't come close to the ability to call your UT opponent a dick. Thanks to KARMA, player bodies will no longer fall through walls or hover half on/half off elevated ledges. Instead the models bounce and fall perfectly, and you'll gape in awe the first time you see someone fall from a great height. You can almost feel the bones crunching. That's if you're not too busy hunting down the right voice taunt for the occasion. I find 'Pain will purify your soul' to be quite appropriate.

With an install size of 2.4GB, you might think that all of these voice taunts take up a heck of a lot of disk space, but they don't, even though some are up to ten words in length – wowzers! This game has more content than you can shake a stack of contents pages at, with fifty character models and thirty maps. Every tool you can think of to modify the game is also included, right down to a copy of MAYA Personal Learning Edition for the budding character modelers.

The thirty maps are spread over four very different game types: standard Deathmatch; Capture the Flag; Double Domination, a variation on the Capture and Hold game, but with only two capture points; and Bombing Run – think Speedball done 3D style, set in large arenas, and you'll have a good idea of what it's all about. Judging by the jam-packed Bombing Run and Double Domination servers, these two modes should be the most popular.

While multiplayer is where it's at, not least because taunting a real human is much more satisfying than hurling abuse at some

line of AI code, single player is surprisingly satisfying. This is thanks to some fine work by the programmers, with very human-like AI routines. I was amazed to watch an opposing AI team form up at the highest point in a map, before equipping their lightning rifles and sitting back for a little sniper camping action. As soon as I got close to them with my flak cannon, they retreated to a safer area of the map. While taunting me. Too cool.

The icing on the cake is how finished UT2003 feels and plays. Still, there are going to be die hard Q3:A fans who won't appreciate this, as they're too busy giving their inflatable John Carmack dolls oral pleasure.

While this game is near perfect, it is still based on Deathmatch and variations of DM. It does add a couple of new ideas to DM, such as combo moves and adrenaline (which gives you temporary special powers when a certain amount is amassed), but if you don't like DM, you're not going to enjoy UT2003. But in the midst of team-based shooters, where you must often rely upon idiotic human teammates, going solo to kick some arse is definitely a refreshing change. And with so many voice taunts to choose from, if you're a DM head you're going to be telling everyone how 'I own you!' for months to come.

9.5/10



GAME DETAILS

FOR: At least 30 taunts for every player – what more could you ask for?

AGAINST: if you don't like DM-based gameplay, don't bother with this game. Too bad for you.

REQUIREMENTS: 733MHz CPU; 128MB RAM; Windows compatible sound; and 16MB 3D card.

RECOMMENDED: 1.4GHz+ CPU; 256MB RAM; EAX compatible sound; and GeForce3 or better.

SOUND APIS: EAX; EAX Advanced HD; and Dolby Digital **VIDEO APIS:** Direct3D

DEVELOPER: Epic www.epicgames.com and Digital Extremes www.digitalextremes.com

PUBLISHER: Atari www.atari.com

DISTRIBUTOR: Infogrames www.infogrames.com.au

PHONE: Infogrames (02) 8303 6800

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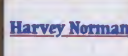
"it borders on a work of art. You have to play it!"
- THE ARMCHAIR EMPIRE 10/10

"I don't think I can recommend this game enough!"
- XBOX EXCLUSIVE 9.7/10

"Almost infinite replayability!"
- GAMES DOMAIN 4.5/5

"the best Xbox game since Halo itself!"
- IGN 9.4/10

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Colin McRae 3

Our very own Possum Born, Bennett Ring, takes us for a paddock thrash.



ABOVE: The physics engine is just plain brilliant.



ABOVE: Detailed cars burn around simple tracks.



ABOVE: Tire fodder comes in a range of colours.

Driving through the bush at a couple of hundred kilometers per hour is one of Australia's national pastimes, commonly known as bush bashing. Take away the beer, add a couple of million dollars in sponsorships, use drivers that can actually speak words with more than two syllables and who don't wear flannelette shirts, and you have the sport of rally driving. Colin McRae 3 is the latest game to give those of us who'd prefer not to risk dying in a ball of flames the chance to thrash really expensive cars through the outback.

Available on PS2 and Xbox, we naturally decided to check out the Xbox version, due to the promise of improved visuals. Oh how wrong we were. Colin McRae 3 is one of those games that has obviously been developed primarily for the PS2, with the Xbox version being a rushed port. While the visuals aren't exactly ugly, they certainly don't make use of the advanced capabilities the Xbox provides. No antialiasing combined with poor texture filtering results in lots of jaggies and texture shimmering. The cars themselves are excellently detailed, albeit with a couple of polygons that don't know whether they exist or not and therefore tend to flash in and out of view. The tracks are not as meticulous as we've come to expect from Xbox games and finally, the dreaded effect of pop-up rears its ugly face on what seem to be quite simple tracks – and for this there is no excuse. Comparing the visuals between Rallisport Challenge (the other rally game on Xbox) and Colin McRae 3 is almost like comparing the

leap in visuals between the original PS and PS2. A pleasing side effect of these simplistic visuals is that the action flows by at a rock-solid 60 frames per second, without a hint of slowdown.

While most of the graphics are a bit disappointing, the weather effects certainly aren't. If you play from the in-car view, your windscreen slowly gets covered with rain or snow; only to be wiped clean every few seconds with each swoosh of your windscreen wipers. Very nice.

If the graphics are somewhat sub-standard, the same certainly cannot be said about the game's physics engine. Its hardcore, realistic and just plain brilliant. Playing Rallisport Challenge often felt like a game of Wipeout in the middle of the bush, with cars that seemed to handle like bricks on rails – in other words, incredibly arcadey. Colin McRae 3's handling is tough enough to please even the most anal of rally fans.

The differences in handling between differing road types is massive, and to be quite frank, a little overwhelming. As soon as you think you can finally handle gravel tracks well, you'll be challenged with your first tarmac course, and be forced to learn how to handle the car from scratch.

Turning through corners is especially realistic, with the very apparent sensation that each tire is struggling to grip the loose road surface. Again, this is a vastly different driving model compared to Rallisport Challenge, and much more realistic. Damage

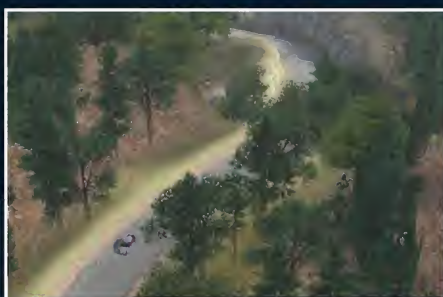
effects are also simulated beautifully, with a loose bonnet being a bit of a showstopper. Every time you go over a jump with a damaged bonnet it will fling up onto the windscreen and stay there until you jam on the brakes. It's frustrating, yet very cool.

It's not surprising that the focus of the gameplay in Colin McRae 3 is the World Rally Championship, and this includes every real world track. There is even a 'shakedown' stage at the start of each new course so you can hone your beast to suit the new environment. Speaking of tweaking your car, the system employed in Colin McRae 3 is both visually stunning and simple to use.

Unfortunately, you can only attempt the full championship as Colin McRae in his Ford Focus. All of the other famous vehicles from the WRC are available in the game, but only for multiplayer or single races. This was probably due to licensing difficulties, but it doesn't help to lessen the blow at all. So once you've completed the championship on the higher difficulty, there isn't much left to do.

Colin McRae 3 is a mixed bag – it has a great driving model that is sadly let down by average graphics and a lack of content. PS2 owners are sure to love this game, but we expected more from the Xbox version. O

8/10



GAME DETAILS

O **FOR:** The best rally driving model bar none; extremely detailed car models with realistic damage simulation.

O **AGAINST:** Graphics are not up to scratch for an Xbox game; can only race the full championship as Colin McRae in the Ford Focus.

DEVELOPER: Codemasters www.codemasters.com

PUBLISHER: Codemasters www.codemasters.com

DISTRIBUTOR: GameNation www.gamenation.com.au

PHONE: GameNation (02) 8303 6800



RED★FACTION II



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No One Lives Forever 2: A Spy in H.A.R.M.'s way

John Gillooly gets in touch with his inner female superspy.



ABOVE: Cate Archer, superspy extraordinaire.



ABOVE: H.A.R.M. has a very 'modern' medical plan.



ABOVE: Great effects, thanks to the Jupiter engine.

Cate Archer's first appearance on the PC was a revelation. No One Lives Forever (NOLF) was one of those games that launched with little fanfare, but soon garnered the respect it deserved. After countless uninspired alien/terrorist killing shooters, NOLF hit the scene with a quirkiness and style that set it apart from the bunch.

No One Lives Forever 2 marks the return of Cate Archer to our PC screens, and follows the original, with some familiar faces coming along for the ride. Cate is initially charged with seeking the identity of the mysterious H.A.R.M. ringleader, known only as The Director, but this is only the beginning, as a mystery develops that drags Cate to exotic locales like a Ninja-filled Japanese Village and a supposedly abandoned Antarctic base.

On the way there, Cate will procure a diverse arsenal of weaponry and gadgetry, putting a distinct spin on the usual first person shooter fare. Some weapons are unique to certain areas and characters, Ninjas tend to be the ones wielding katanas and shurikens, while the Russian soldiers go for the good 'ole AK-47 assault rifle, and evil mimes are big fans of Tommy guns.

Cate can use all these weapons, but also has some specialist gadgets supplied by Santa's workshop, the name of the labs back at UNITY headquarters. These range from the strangely logical – a lighter that doubles as a butane torch to get past pesky padlocks, to truly whacko concepts such as Angry Kitty, a small robot kitten with a proximity sensor and

a tummy full of TNT. While the game generally follows that standard linear first person shooter path of progressing from mission to mission, it does so with panache and innovation. For example, the second locale in the game is the general area of a Russian military base deep in Siberia. You are tasked with knocking out power and communications before waiting for nightfall and infiltrating the base. To do this you need to criss-cross the area on a snowmobile to get to the various locations.


Rather than an in-game map that shows your exact location, you collect a map like any other in-game intelligence. Navigation involves looking at the hastily scribbled notation on the map, memorising landmarks and then switching back to your normal view to get on your way. In other words, you need to use the in-game map like you would normally use a map. It is a very satisfying and surprisingly different touch, something that the game is full of.

Similarly, NOLF 2 implements a rudimentary skill system, in which you gather points by collecting intelligence and completing objectives. These points can be spent to increase your skills, such as speeding up your ability to search downed enemies, or increasing your stealthiness.

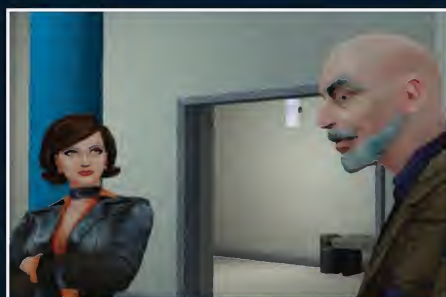
To break up the adventuring, NOLF 2 features some great cut scenes that, like its predecessor, are full of genuinely funny gags and astonishingly good voice acting and lip-synching. This is thanks to Littech's new

Jupiter engine, that may not be as laden with eye candy as Unreal Warfare but is still an amazingly good-looking engine.


The single player mode is shorter than the original NOLF, delivering between 10 and 15 hours of gaming, which leaves you wanting more and holds the game back from scoring higher. This is partially mitigated by a multiplayer mode that is seldom seen nowadays. Rather than the usual deathmatch/capture the flag fare, NOLF 2 supports up to four people playing cooperatively through a mini-campaign that is interwoven with the main storyline. In this mode you play a team of UNITY agents sent in to either pave the way for, or clear up after, Cate's shenanigans. It is good fun but really shines on a LAN, as Internet play can get quite laggy at times. This mode can also be played solo if you are just looking to extend the NOLF 2 experience.


Monolith has done a great job with No One Lives Forever 2. Our main concerns lie with the relative brevity of the game, but once you get over this there is perhaps the finest single player FPS experience of the year lying underneath. NOLF 2 is everything your normal shooter is not: bright, colourful, quirky, funny and above all, oodles of fun. 

9/10



GAME DETAILS

 **FOR:** One of the best single player shooters out there.

 **AGAINST:** Slightly marred by its brevity.

REQUIREMENTS: 500MHz CPU; 128MB RAM; 32MB Hardware T&L video card

RECOMMENDED: 1GHz CPU; 256MB RAM; 64MB Hardware T&L video card

SOUND APIS: Direct Sound **VIDEO APIS:** Direct3D

DEVELOPER: Monolith www.lith.com

PUBLISHER: Sierra www.sierra.com

DISTRIBUTOR: Vivendi Universal www.vivendi.com

PHONE: Vivendi (02) 9904 4533

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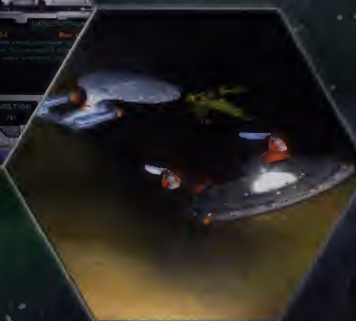
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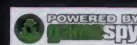


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Kingdom Hearts

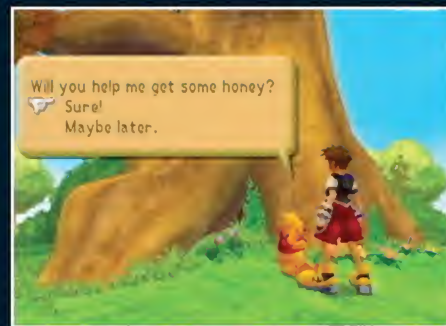
Take a look at Square's Goofy-est game yet with John Gillooly.



ABOVE: One of the most colourful battles ever



ABOVE: Take my hand off to Never Never Land



ABOVE: Damn Pooh always wants more honey

It's easy to imagine that in the dreggy aftermath of a big night of partying, Kingdom Hearts somehow came into being. You can picture a bunch of seedy-looking people sitting around talking crap, when out of the blue one of them says 'Tell you what would be cool - Final Fantasy, but instead of fighting Sephiroth you fight Mickey Mouse'. Cue the stunned cries of 'Whoa dude' and 'Cool' from nearby partygoers, who without realising it, have stumbled onto a wicked idea for a game.

Well, it looks like someone somewhere enacted this very scenario, because Squaresoft's new title, Kingdom Hearts, involves this very trippy mix. You are cast as Sora, a spiky haired, wide-eyed 14-year old, equipped with a pair of regulation Anime puffy pants. Sora embarks on a journey to rescue his friends, who have mysteriously disappeared after an ominous void opened and sucked everyone out of the idyllic Destiny islands. This is, oddly enough, where you start the game. This disturbance is also affecting other worlds and a *certain someone* is required to find out what's happening, as he has been charged with secretly protecting the worlds. He has large black ears, lives in the Disney Castle and has the uncannily familiar name of Mickey. After Mickey leaves the Castle under secretive circumstances, his two friends, Donald and Goofy, go looking for him.

You can guess what happens next. Sora meets up with Donald and Goofy and they join forces to journey from world to world, in search of the truth. The worlds in question all

revolve around a Disney experience - you will set foot in Wonderland to save Alice from beheading, and flit to the Deep Jungle to help Tarzan rescue the Gorillas.

Along the way you will get an inkling of the evil conspiracy behind the baddies, known as the 'Heartless'. The game villains are also drawn from the Disney annals - the bad guys are headed by the evil queen from Snow White. Each world's villains are possessed by the Heartless, who work towards the nefarious end point of the conspiracy.

The characters you meet along the way aren't all Disney veterans, however. Some very familiar faces to those who dabble in the Final Fantasy series of games also keep popping up, including Cloud and Squall to name but two.

Gameplay has its feet firmly planted in the console RPG world, but most of the game is played like a 3D platformer, with battles occurring in realtime, rather than the increasingly turn-based battles of the Final Fantasy series. There is a lot of jumping and hunting around for hidden items, but this is a relatively painless and forgiving experience.

Graphically the game is an amazing achievement - the look of each world is unique in both theme and content. Square has made a concerted effort to faithfully recreate the look of the original movies and television shows that the worlds are based on, and this acts to enhance the feeling of moving through different worlds, rather than just a series of different levels.

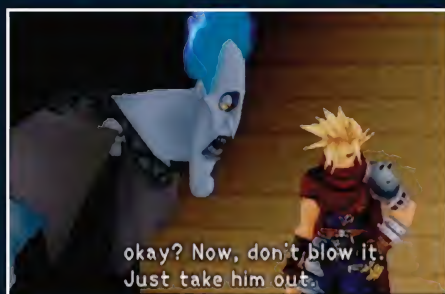
Tasks revolve largely around puzzle

solving, complemented by a healthy dose of combat. The puzzles demonstrate plenty of variety and are not horrendously tricky, providing a solid challenge for gamers of varying levels. The tasks and objectives differ greatly between the worlds - for example, the Hercules-based level revolves around a series of battles within the Coliseum. As the game progresses you can return to compete in various cups, which consist of multiple back-to-back battles against progressively harder enemies.

Like most Squaresoft titles, Kingdom Hearts is a long game, when compared to the standard ten hours feed to us by most other recent games. There's also a lot of side questing to be done, including a major one where you'll need to find the 99 missing Dalmatians that are scattered throughout the worlds present within the game.

Squaresoft has done a terrific job, taking some classic material and an incredibly bizarre concept and making it work. Kingdom Hearts is such a compelling, unusual and well rounded game that you don't need to be a Disney (or Squaresoft) purist to enjoy the experience. It manages to walk a fine line, delivering an enjoyable game for both kids and adults, while not making compromises. O

9.5/10



GAME DETAILS

O **FOR:** Addictive and varied RPG gaming revolving around some familiar and much loved Disney and Squaresoft characters.

O **AGAINST:** Occasionally aggravating between-world travel sections, lots of jumping puzzles, Donald Duck has one damn annoying voice.

DEVELOPER: Squaresoft www.squaresoft.com

PUBLISHER: Sony Computer Entertainment www.au.playstation.com

DISTRIBUTOR: Sony Computer Entertainment www.au.playstation.com

PHONE: Sony Computer Entertainment (02) 9324 9500

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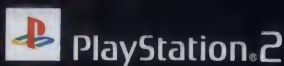


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GAME BOY ADVANCE

PC CD-ROM



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Sudden Strike II

Des McNicholas opens a can of WWII-vintage whoop-arse and skols the lot.



ABOVE: Convoys are duplicated in all their glory



ABOVE: Scenery is realistic, in a gritty, war-ish way



ABOVE: Troops place mines – tanks run into them

The original *Sudden Strike* did an exceptional job of bringing WWII into the RTS realm, so developer CDV has understandably stuck with a proven formula in *SSII*. So much so, that some players will be disappointed with the lack of any real improvement to the cumbersome interface and below-par briefings. Fortunately, players hoping for a less demanding challenge this time are also in for a nasty surprise, because *SSII* is a very complex, concentration-intensive strategy title that provides an unequalled WWII experience for those prepared to tough it out.

Players can take the field as Germans, Russians, British, Americans or Japanese in a series of very tough missions around the globe, with air and maritime assets also playing a major role in many scenarios. Five campaigns, 40 missions and multiplayer via LAN, Internet or modem are included, along with a few very basic tutorials. Sadly, old player-designed games can't be imported, suggesting that far more has occurred to the engine than appears on screen, but the improved map editor will please those with an eye for detail. The editor documentation is disc-based and the game itself comes with a reasonably comprehensive manual.

SSII focuses on the major actions of 1943 and '44. The German and Russian campaigns depict the huge battles around the Voronezhsky and Stepnoy fronts; the Brits do a great job of re-creating the failed Operation Market Garden; the American campaign covers the push to the Rhine; and the

Japanese chapter concentrates on the 1942-45 Pacific Islands battles. The campaigns are of varying difficulty (all bloody hard!), and each requires unique tactics tailored to the equipment and time available. Overall, CDV has done a terrific job of building the campaign structures, but the odd mission seems a little unrealistic and a flatter learning curve would help.

Veterans will immediately recognise *SSII*'s interface, along with many of the problems they had hoped to see fixed. Identifying different types of infantry is still too difficult – particularly given the importance attached to their various roles in some missions – and players will spend a great deal of time regrouping their units at the start of each game. Automatically balanced and grouped squads would have been a far better approach and more on-screen information would help. Similarly, the controls are not as intuitive as they should be in such a tactically complex game, with the need to change or repeat commands becoming frustrating at times.

Those problems aside, *SSII* looks stunning and many aspects of the interface are excellent after a few practice runs. CDV has given the majority of the available space to the terrain, all of which is beautifully modelled to scale. Aircraft are easily controlled, with both scouts and bombers following quickly assigned routes to their targets, and driving ships and landing craft is a simple point-and-click affair. Skilful use of the orders menu and the hot-key list is the

key to victory, although the process takes a little longer to master than in the average RTS title. Thankfully, orders can be given while the game is paused, and holding the shift key and specifying a series of actions can establish order sequences.

SSII comes with an excellent mix of unit and vehicle types, all of which (except the infantry) are individually modelled to a high standard. The lack of any real range or capability information hides the combat differences between each type, but it's clear that CDV has put a lot of work into this aspect of the game. Trucks, jeeps, tanks, ships, aircraft and trains are all available, and many missions include their use as part of the required objectives. It's a shame some highly capable assets are wasted by an AI that doesn't always show much initiative, but the overall mix adds a lot to the game.

SSII is a tough game that hides some terrific elements behind an average control interface and some strange design decisions. It's OK once you master it, but novice players are unlikely to persevere. This is a shame, as a few minor (and obvious) improvements would make *Sudden Strike II* an outstanding and accessible title, rather than the hardcore niche game it's destined to be.

8/10



GAME DETAILS

FOR: Looks fantastic; well designed campaigns; and a great mix of units.

AGAINST: Cumbersome interface; infantry too hard to distinguish; and steep learning curve.

REQUIREMENTS: PII 333MHz; 64MB RAM; and 350MB HDD

RECOMMENDED: PIII 450MHz and 128MB RAM

SOUND APIS: Direct Sound **VIDEO APIS:** Direct3D

DEVELOPER: CDV www.cdv.de

PUBLISHER: CDV www.cdv.de

DISTRIBUTOR: Red Ant www.red-ant.com.au

PHONE: Red Ant (02) 9882 3791

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Stronghold: Crusader

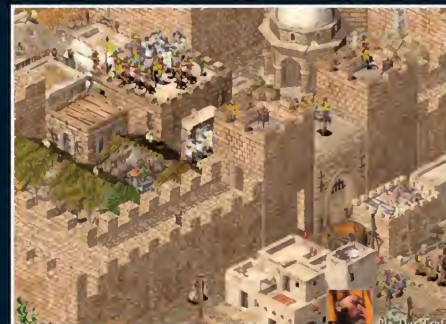
Des McNicholas gets medieval on the new Stronghold.



ABOVE: I only asked for a cup of sugar!



ABOVE: ABC (another bloody castle) tour underway



ABOVE: Fetch the Holy Hand Grenade of Antioch!

Having whet our appetites for all things medieval with the original Stronghold, developer Firefly Studios takes us back to the days when murdering, pillaging and general bastardry could all be written off in the name of God. The battlegrounds have changed from the lush fields of Europe to the endless desert wastes. However, Stronghold: Crusader keeps the key elements that made the original such a success and brings additional units, new weapons, a great mix of castle options and some huge campaigns to the fore. While there are still some empire-management tasks, economic issues take a back seat this time in both the campaigns and skirmish missions.

The Crusades occupy an interesting place in both Western and Middle-Eastern history, when the world's two foremost religions clashed for control of the Holy Lands and, ultimately, civilisation itself. In practice, of course, chivalry played a very small role, with the Crusades standing as almost unrivalled examples of savagery, brutality and political opportunism. Crusader provides four campaigns loosely based on the attempts made by Richard the Lionheart and his nemesis Saladin to capture and hold Jerusalem. The game includes an extra 50-mission Crusader Trail, an excellent skirmish mode and Stronghold's popular free-building (as well as safe!) mode. Multiplayer supports up to eight players via LAN and Internet. Map and scenario editors are also included.

Although the economic campaigns have been axed, players still need to gather

resources and establish a thriving settlement. Fortunately, all that's required is creation of the necessary facilities, such as farms, wood cutters' posts, housing and military buildings, after which the peasants will send themselves off to work. The system works well, with the player's key economic role being to balance taxes and ration levels to attract and retain the peasants needed to build an army. The AI is far stronger in this area than it was in Stronghold, allowing enemy villages to expand quickly into castles and gain military prominence; early defensive measures become vitally important.

Building and unit construction are straightforward, helped again by voice-overs from the Scribe. His job is to keep players up-to-date with the current economic, military and social health of the community and provide guidance where necessary. The Scribe's advice misses the mark occasionally, reporting contented folk when the castle is about to fall and the countryside devastated by rival lords, but generally it works OK. All key indicators can be accessed via a simple interface, while on-screen icons and dialogue deliver a good overall feel for the mood of the population. Corrective action is usually obvious once a crisis arises, and players will either love or hate the system for its simplistic approach to resource management.

Firefly has applied renewed focus on combat with a range of fresh units and weapon types, thanks in part to the host of opportunities provided by non-European

opponents. On hand are fire ballistae, horse archers, assassins and Arab mercenaries, supported by a terrific range of catapults, battering rams, cow-chuckers and armoured horsemen. The balance is about right, with a good mix of units, castle designs and tactics accessible to both Christian and Muslim commanders. The control interface is well suited to organising large-scale forces; units are easily grouped; waypoints and assembly areas can be established and a useful location book-marking feature is mapped to the mouse-wheel. Friendly AI is solid but not great, particularly while path finding within castles or in complex terrain, and things get cluttered once close combat kicks in.

Stronghold: Crusader is a strong title that takes the concept to the next logical stage. The broader mix of unit types and nationalities provides a more interesting challenge than the original and the emphasis on skirmishing is a smart move. It warrants praise for the sheer size and range of game options provided, but Firefly has also produced well-crafted campaigns, an excellent interface and a decent economic model. Terrific use is made of music and cut-scenes to set the atmosphere and it has the right learning curve to attract new players. ○

8.5/10



GAME DETAILS

○ **FOR:** Looks superb; good mix of new unit types; and the Pope is on side.

○ **AGAINST:** AI is occasionally suspect; and the accents of the rival warlords are disastrous!

REQUIREMENTS: PII 333; 64MB RAM and a 850MB HDD

RECOMMENDED: PIII 450 and 128MB RAM

SOUND APIS: Direct Sound **VIDEO APIS:** Direct3D

DEVELOPER: FireFly Studios www.fireflyworlds.com

PUBLISHER: Take2 Interactive www.take2games.com

DISTRIBUTOR: Take2 Interactive www.take2games.com

PHONE: Take2 Interactive (02) 9482 3455

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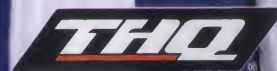


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PlayStation 2



Anna Kournikova

Two things are certain – one is certainty itself, the other is that computers will always deliver conundrums. That's why we have IO. And Dan. And a free Logitech Dual Optical mouse for IOOTM. More good questions this month, but we worry that nobody has yet asked what you'd get if you crossed Britney with Anna.



i IOOTM: Tweaking and tuning

I found the section in my BIOS where I can change the FSB, multiplier, voltage. . . you know. . . da good stuff. I tried to play around with this stuff but it won't let me change anything. I did the pencil thing to unlock my CPU, but still no joy. Why?

My mobo is the really cheap ECS K7S5A, and I'm running a Duron 1.2GHz.

Also, I have a 'TV Excel' TV tuner card in my PC and it worked great until I changed to WinXP, which doesn't like it. I went back to WinME and it was all good, then back to XP and it didn't work. I know I need an XP driver, but where do I get it? The TV card has the Conexant BT878 chipset on it and a Philips tuner.

Annette McArthur

O Your K7S5a lets you see the FSB, multiplier and voltage settings, but the only one you can change is the FSB, and then only from 100 to 133MHz.

You can try that if you like, but as there's no CPU voltage adjustment, a 33% overclock attempt is very unlikely to work.

If you're really hot to try overclocking on this motherboard, there are some tweaky home-made BIOSes for it available, which are free to download and possibly worth what you pay. Have a look at <http://pub65.ezboard.com/bk7s5amotherboardforum> for downloads and information.

All the BIOS-twiddling in the world won't turn this board into an overclockers' special, though; if you put a more than trivial value on your time, you'll do better to just save up for a new motherboard.

Your TV tuner card is a Pixelview 878TV. Check out www.prolink.com.tw/new_web/download/protv_multimedia.htm for drivers to suit lots of its cards.

i XP or not XP?

I recently upgraded my Celeron 400 to a 2GHz P4 with 512MB DDR RAM and a GeForce2 MX (I plan on upgrading that later).

I am currently running Win98 Second Edition and I am thinking about upgrading my OS to WinXP.

What would be the advantages of me upgrading to XP? Would my PC run a lot better with a newer OS?

Alexander Piriz

O With a fast CPU and a pile of RAM – 256MB or more – the current NT-series OSes (Win2000 and WinXP) are both preferable to any of the Win95-series OSes, including Win98 and WinME.

The NT-series OSes are giant resource hogs: they must have a massive amount of RAM for decent performance, and it really helps to have a recent CPU as well.

If you have those, though – and you do – then the NT-series OSes are better just because they're stable.

Yes, Win2000 and WinXP can crash, and crash hard, but failures certainly aren't the daily event they are with Win98 machines.

You also don't have to reinstall the NT-series OSes nearly as often, if ever.

For my money, that's about it for the major advantages of 2000 and XP.

There are tons of other twiddly bits in 2000 and XP which may turn your crank, but for most home users, I really don't think that they're worth spending money on. Stability is.

i Secondary choice

Are you the same guy who I used to read in *Australian Commodore and Amiga Review*, back in the pre-Pentium days when Amigas were real computers and PCs were just business machines?

Reminiscing aside, I have a problem I hope you can solve.

My computer runs Windows XP, and has an Athlon XP 1800+ and an ASUS A7V266-E motherboard.

I have recently acquired an All-in-Wonder 7500 video card, a great card for a great price if, like me, you aren't a hardened gamer. Photoshop, Director, Dreamweaver and Premiere are where I get my jollies.

For this I need heaps of screen real estate, so the All-in-Wonder is for my 19in monitor to hold my work area.

I now need a PCI video card for the 15in monitor to hold all my tools.

My problem is choosing which PCI video card will do the trick, without costing as much money as I spent on my primary AGP card.

There are not many PCI video cards out there, and those that are make no claim to be XP compliant.

Could you help me please?

Jonathan Clough

O Yes, I used to be half of the crack *ACAR* editorial team. You know, that 150W AT PSU with the hacked-on cable that's sitting on the shelf over there probably isn't ever going to power an A500 again. I should probably put it in the cupboard, or something.

Getting back to the present day – you can't buy any old PCI card to use as a secondary, but lots of them will work, and there are WinXP drivers for various popular boards.

Any NVIDIA-chipset board (an old TNT or TNT2, for instance) will be OK, as will any recent ATI card (a RAGE 128 would work), and any Matrox card from the G200 onwards.

A lot of computer stores don't stock many, or any, PCI video cards any more, but they're not hard to find on auction sites and at computer markets.

i Budget computing

I've just gotten my hands on an old Cyrix II 300 (runs at 233MHz), and was wondering if there would be much chance of getting it to around 300MHz with adequate cooling?

The mobo is a Socket 7 PC100 SystemBoard M571 and has a manual showing how to do voltage, FSB and multiplier adjustments.

Also, on the same mobo, there is an onboard video card (don't die of shock) but I believe it can be disabled. At the moment, it is currently greyed out in the BIOS and I can't touch it. Do you think I would have to insert a different vid card to be able to get to it?

Any help on any of this would be much appreciated.

Simon Pfeiffer

O It's possible to overclock a Cyrix II, but not by much; they run pretty close to the redline at their stock speed. 266MHz is likely to be the best you can manage. Even at that speed, the II will be a very unexciting performer — perfectly adequate for many applications, but not fast compared with an antique Celeron 300A, much less any current CPU.

The M571 only has the old 66/75/83MHz CPU FSB speeds, and 83MHz is unlikely to work. But it has multiplier jumpers, and you don't have to do anything to unlock the multiplier of any Socket 7 CPU.

The most you're likely to be able to wring out of any chip on this board is 5.5 (the highest available multiplier) times 75MHz, or 412.5MHz core speed. But you should, at least, actually be able to achieve that, if you hit the auction sites and pick up a cheap AMD K6-2 or K6-III.

Those processors want 2.2 or 2.4V core voltage, mind you. Older M571s only offer 2.5V as their minimum core voltage, which is on the upper side of acceptable for a 2.4V chip but rather too high for a 2.2V one. Newer M571s have 2.2V as well.

Assuming your M571 offers a useable core voltage, you should be able to run a dirt cheap K6-2 400 at a smidge more than its rated speed. At 412.5MHz, a K6-2 will give you the thick end of twice the CPU performance of a 266MHz Cyrix II.

It's also possible to upgrade the M571's video: you use jumper JP3 to turn off the integrated video adaptor, and then you can install a video card.

The M571 doesn't have an AGP slot, though, so you'll need a PCI video card. Hunt around for a Voodoo 3 or Kryo board to give you worthwhile 3D performance on the cheap.

The M571 is unlike a lot of PC Chips/Systemboard branded products, in that there's actually some worthwhile info about it online: see <http://m571.com/m571/>.

i The voltage mystery

After seeing your *Heavy Water* series, I decided to have a go at your 12V/off/7V switch as a fan control. Big problem though: after wiring everything up I'm only getting 12V outputs.

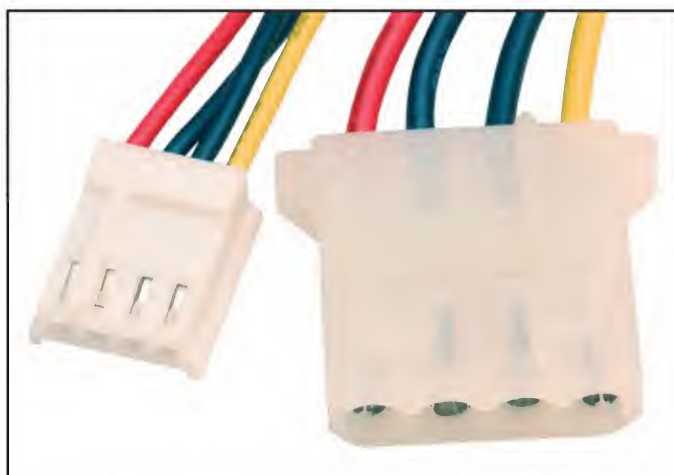
I checked everything out with my multimeter, and the voltage between the +12V and the 5V ground is still 12V! Any ideas why this has happened to me and not you fellas?

Alex Walsh

O If you measure the voltage between a 12V (yellow) wire and a 5V (red) wire, you'll get 7V. Well, unless the lead from your PSU is miswired.

If you measure the voltage between a yellow wire and a black wire, though, you'll get 12V. I think you might be doing that, because you mention '5V ground'. Ground is ground; both of the black wires are electrically connected to the same ground back at the PSU. The difference between either of them and the yellow wire is 12V.

Note that this hack, while very simple, is not particularly elegant. If you short 12V to 5V (by accident, or because of a fan defect) you'll end up with 12V on the 5V rail, and probably blow up various components.



ABOVE: Red is 5V, yellow is 12V, and the black wires are identical earths

i Medic!

Do you guys know any ways of re-pinning a CPU? I have a few chips that have lost or damaged a pin or two through travelling to and from LAN matches.

Also, I'm trying to find a version of Linux that looks and acts like Windows.

Zsebastian Bane

O Umm. . . how, exactly do you travel to and from LAN parties? By pogo stick?

Never mind.

Regardless of how exactly you've managed to damage CPU pins without re-kitting the whole computer, it seems likely that the processors are going to stay damaged. It's possible, if you're lucky, to unbend slightly bent CPU pins, but that's it.

Replacing them doesn't seem to be something you can do for less than the price of a new processor, unless you're good at fine soldering and the busted pin is on the edge of the package.

As regards your Linux question – try Lindows (www.lindows.com), or Redmond Linux (www.lycoris.com).



i 512MB of disappointment

I bought a KT2 Ultra ARU-RAID motherboard about six months ago. To go with it, I had 256MB PC2100 266MHz CAS 2 RAM, which worked fine.

Last week I sold that RAM and bought an AMD/Intel-certified 512MB PC2700 333MHz CAS 2 module. I'd heard months ago from Websites and magazines that if you run 333MHz RAM at CAS 2 on this mainboard, the system will become unstable.

Thinking that the RAM is AMD/Intel-certified, I presumed it would be OK to run. When I set it to CAS 2, though, the system became really unstable. So I'm forced to run the RAM at CAS 2.5, which is much slower than what it is capable of.

Do you know what the problem is, and do you have any solutions for me?

Ethan Tay



ABOVE: If you must buy RAM with decorations, try getting the heat-sunk type, like this, not the type that just has misleading stickers on it

Umm. . . I wasn't aware that AMD or Intel actually did certify RAM. I don't know what sort of certification they'd provide, anyway. They make chipsets to work with RAM that meets JEDEC standards, but neither company makes a chipset that even supports PC2700 (333MHz DDR) RAM, as I write this. It's my considered opinion that someone just put a sticker on the module that said 'Certified'.

In any case, it doesn't matter how 'certified' the memory is, if the problem lies with the motherboard. Extreme RAM tweaking is difficult on lots of boards, so changing the RAM you use may or may not help.

In any case, CAS 2.5 is not 'much slower'.

CAS latency is how many clock cycles it takes for the memory to start a read operation. It doesn't have anything to do with how fast the read operation itself proceeds – that'll be the same, for a given RAM clock speed, regardless of the CAS latency. Lots and lots of read operations happen every second, of course, but the impact a CAS 2 to CAS 2.5 change will have on performance for all but the weirdest of PC tasks will be well under 5%.

For tasks that don't lean on the RAM very hard – and most PC tasks don't – the difference will be barely measurable, and certainly not noticeable.

i Handy hint

Hi, just thought everyone should be reminded of a handy site if they are having trouble finding drivers for obscure hardware. Most products have an FCC ID number on them somewhere. It's a simple matter to enter this number into the page at www.fcc.gov/oet/fccid/.

This will tell you the name of the manufacturer of the hardware. Do a Google search and it's a piece of cake to find its Website, if one exists. . .

Of course, most of the more I337t among us Atomicans would probably already know this.

Iain Best

i Clear computing

If one were to make a case entirely out of Perspex/acrylic, what problems could this cause? I thought that the case acted as earth to all the parts inside – isn't it a very good idea to keep these parts earthed?

I'm probably wrong, because the earth on the power connectors etc probably takes care of this, but I thought I should ask, as your I337 knowledge is far superior to mine ;p
Steven Sorrell



ABOVE: Some windowed cases, like this Lian Li PC-6099, now come with an Aluminium plate installed behind the window. Without it, they're very likely to break EMR rules.

There's nothing wrong with making a plastic case, beyond the fact that it won't provide any RF shielding.

Earthing isn't the issue; as you say, the power connectors take care of that. But metal cases don't let electromagnetic radiation (EMR) out of, or into, the PC.

Anywhere there's no metal, EMR can get in and out, provided its wavelength is short enough that it fits through the hole. Grilles aren't an issue – great big holes cut in the side for windows are.

A clear plastic case would work just fine, provided nothing nearby was bothered by interference from the PC, or broadcast enough RF that the PC had a problem (which is very unlikely, in home and office environments).

Clear plastic can be made conductive by 'metallising' – applying a thin conductive layer to the surface. A really thin film of metal is conductive enough to block RF, but won't darken the plastic much. It's not cheap, though.

If you make un-metallised cases and sell them then you could be in trouble, especially if you sell cases with components already in them.

But running a PC in a plastic case is like running a PC that's just a bunch of components sitting on a newspaper on your kitchen table: the amount of interference generated isn't likely to be sufficient to annoy anyone, so nobody cares.



Phr33x tw33x

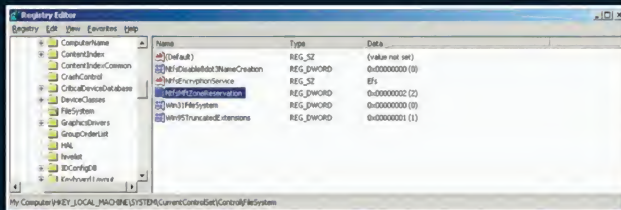
Welcome to Phr33x Tw33x, a new section of *Atomic* where Simon 'Phr33x' Peppercorn reviews the best reader-submitted tweaks each month. He'll test them, evaluate them, provide an explanation of what they do, and give them a rating of *Atomic* goodness. Send your clever goodies to him at the address up top.

We could give you a long-winded disclaimer here: *use at your own risk* and so on – and all of that does apply. Basically, we want you to know that we've tested the tweaks across a range of hardware and will tell you about any problems encountered.

But don't blame us if it goes bad for you and you find yourself:

1. Reinstalling your OS;
2. Replacing rooted hardware; or
3. Crying because your 'puter is now an expensive doorstop.

That said, if you have any comments about the tweaks, or have some of your own you would like us to test, email phr33xtw33x@atomicmpc.com.au. We can't promise a reply, or that your tweak will get published, but your name *will* go down in *Atomic* glory with RedBull and vodka drunk in your honour.



Smart files

Madrat007 sent us a great little registry tweak that addresses a problem with NTFS MFT fragmentation.

This one is for those of you (most, I expect) who are running WinNT/2K or XP and have an NTFS partition. This will not work if you have a FAT file system.

For those who haven't run regedit before, click on the Start button, select Run, and then in the Open box type 'regedit'. Just like Windows Explorer, on the left side there is a tree with folders, and on the right the contents (values) or keys of the currently selected folder. By double clicking on the folders on the left, you can drill down into the guts of what makes Windows tick. Beginners should not mess too much in the registry, because the damage you could do could be enormous. For this tweak you need to drill down and find:

HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Control\FileSystem

When you have found it, right click in the right pane to create a new DWORD value, call it 'NtfsMftZoneReservation' and set the value from 1 to 4:

- | | |
|-----------------------------|---------------------|
| 1: Small Zone Reservations | – 12.5% (default) |
| 2: Medium Zone Reservation | – 25% (recommended) |
| 3: Large Zone Reservation | – 37.5% |
| 4: Maximum Zone Reservation | – 50% |

Don't forget to reboot.

O Every NTFS volume has a Master File Table (MFT). The MFT stores information, such as file size, permissions and time and date stamps, for every file on that volume. If all the file attributes,

including the actual file data, are smaller than the size of the MFT record (each MFT record is 1024 bytes long), the data will be stored within the MFT itself.

The MFT produces a few problems for Windows. A fragmented MFT can seriously affect performance, because it's constantly referenced as each file is read from and written to.

As MFT records cannot be moved, there is no way of defragmenting them without expensive defragging utilities (Windows defrag won't help). The table can grow as files are added, but when files are deleted, the entry on the MFT is marked as free and may be reused, so the table remains contiguous, but doesn't shrink because the entries are not reclaimed.

When you create an NTFS volume, a percentage is reserved for exclusive use by the MFT. Unless all other space on the volume is used, file or directory space will not be allocated from the area reserved for the MFT. However, depending on things such as the number of files, and the average file size, either the reserved MFT space or the unreserved free space on the volume will be filled first. In other words, a volume with a large number of small files will fill the MFT space before a volume with a small number of large files. In either case, fragmentation of the MFT will occur. By controlling how NTFS reserves space for the MFT, you can minimise the likelihood of the MFT fragmenting, and slowing down your system. So strap on your steel capped boots and head off to your Windows registry.

But here is the clincher: this will only work on an NTFS volume created *after* creating the registry entry. It won't affect existing volumes. Ideally you will install Windows onto a clean partition, then create the registry entry and then create your other volumes.

You can go ahead and use the max zone reservation and you won't effectively lose any storage space as NTFS will use the MFT if you run out of the regular file storage area. But this will also lead to fragmentation of the MFT, which we want to avoid. So remember to keep some disk space free for the MFT.

1337ness 7/10

Fast files

While on the subject of NTFS, swherdman sent in this little gem.

Once again, this is for Windows NT/2K/XP users with an NTFS filesystem. Fire up regedit and head down to:

HKEY_LOCAL_MACHINE\SYSTEM\CurrentControlSet\Control\FileSystem

Double click on the 'DisableNTFSLastAccessUpdate' key and set the value to 1.

O Timestamps in an NTFS filesystem are automatically updated when traversing directories. This is a pain in the butt for most people as it only slows down larger volumes and naturally, is turned on by default. So turn the sucker off.

1337ness 6/10

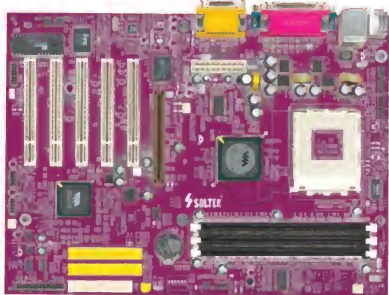
SUB ATOMIC

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- Five PCI expansion slots
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- 200/266/333MHz
- WORTH: \$200

Contrary to popular belief, hijacking a postman's motorcycle to pinch someone else's *Atomic* subscription is against the law. So instead of placing another intricate bike trap this month, why not simply become an *Atomic* subscriber? For one, the postman will no longer fear approaching your house, and two, he will learn to greet you with a smile, rather than a scream. As a bonus, you'll sidestep the recent price increase, as subscription is still at the same low price of \$49 for one year and \$80 for two. Too cheap.

Atomic 21 winner – e.wear SV-SD80. H Reschke, Mt Annan NSW.

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Fat free lettuce

Welcome to our temporarily trimmed back Letters page. We're back to full-fat next month! LOTM picks a copy of Diablo Battlechest, which sports Diablo II and the Expansion set, plus the *Diablo* novel and the strategy guide, thanks Vivendi.



LOTM: Optus spoilsports

I have been following the Uber Linux box project with great interest and have built myself a great little firewall router. I was particularly impressed with the coverage of remote management features via SSH and Webmin. I also created an account with DynDNS.org, so that I could maintain a constant presence. I eagerly set up these features in the Linux box, opened up the relevant ports on the firewall and

left my cable there waiting for my connection. I tested from work, and to my disappointment, was unable to get a connection via Webmin or SSH. Ok, I must have set something up wrong.

That evening, I double-checked the configurations and all was well. I put it down to an X file. So next day from work tried and failed to connect again, so I thought 'let's see if I can trace through via tracer'. No probs til I hit 'Optus router 211.28.110.20 Rochd1-fe0.cm.optusnet.com.au'. Methinks a quick call

to the cable support to report the problem will result in action. Methinks wrong! I am basically told bad luck and that connections to the net other than browsing the Web are not supported. Come on Optus, the days of using the net for pure browsing is long gone! Nobody is asking to run a service such as email server or Web server from a residential service, but it would be nice to be able to be able to operate outside the square.

Geoff P

POTM: Atomic lightbulbs

This hilarious thread started by athlonxp81 opened the floodgates for Atomicans to take the piss out of themselves beautifully. Dozens of genius posters followed athlonxp81's lead with clever parodies of the things we do. A free one-year Atomic sub for you athlonxp81!
www.atomicmpc.com.au/forum.asp?cat=ge&t op=66090

How many Atomicans does it take to change a lightbulb?

- 10 To deny the existence of light bulbs.
- 23 That tell you the light bulb you bought is the wrong one.
- 13 To tell you how to overclock the light bulb.
- 43 To tell you the different ways to screw in the light bulb.
- 66 Need to be told what a light bulb is.
- 25 Try to use burnt-out light bulbs
- 12 To tell you that you shouldn't use light bulbs because of some stupid reasons.
- 34 Want you to send them money because light bulbs give them cancer.
- 98 Some of them give answers not relating to light bulbs.
- 54 Tell you how to mod the light bulb.

Tux the killer penguin

All hail Tux master Ashton Mills for his Uber Linux box tutorials. I love the really cute and cuddly gun-totin'-sadistic-killer Tux pics at the bottom of

each tutorial. Who drew those awesome cartoons? Is it Captain Atomic illustrator Ronald Marc? Thanks for the best mag on earth.
Doug Edmunds (aka Litehammer)

Thanks Doug, Ashton's Uber Linux stuff went down a treat, and his support for Atomicans on the forums has been awesome too, we'll be doing more in the future, that's a sure thing. Well spotted! The Tux illos are indeed Ron's work. We really should have credited Ron, but somewhere along the line that didn't end up happening. Sorry Ron, and thanks!

Case modding or fashion parade?

As time goes on, the more it seems that people need to make their computer look special or different. Go to a LAN with a case that looks like you found it at the dump and people expect it to be below average inside. Then you look over at a nicely converted case and wonder how far overclocked the computer is.

How far will case modding go? I've even seen a window and LED put onto two hard drives. Maybe in the near future they will bring out LED cases. There's already an LED fan. People are prepared to fork out an extra \$30 if the case is painted black! It has amazed me how far case modding has come since I saw my first case mod at a QGL — a guy had painted his case red, and everyone was thinking he was weird for

doing so, then in two months, the same people who looked at him had window kits set-up and had painted their case. Seriously, how far is case modding going to go?

Ben S, QLD

It's only just begun, Ben :)

It's 'bollocks', mate :)

What can I say, it's the dogs bollocks, the mutt's nuts, the cat's arsehole. I could go on, but then again I couldn't, we're very reserved, us Brits.

While traveling around your fine country I was feeling a bit home sick; missing my PC and only having a laptop for company. Then I spotted a copy of **Atomic**, I lugged it to every country on my big O.E.. So many magazines have got pictures of the latest PC from so & so and all you see is another box, with the manufacturer's specs reprinted and whether the reviewer found the power switch, then got a bloody SiSoftware Sandra score with no correlation to other components, or clearly defined benchmarks. Who cares about seeing the box, we wanna see what's inside, we want the specs in detail and what tweaks we can play with. That's what I love about Atomic: you get the real nitty gritty, chipsets and all. You've got good blokes who know what they are talking about and that shines through in your mag. Quality mate, quality.

Jeff

Fr33

JNC SSF-164 MP3

In the good old days, commuting by public transport involved running a high risk of being stuck next to some dude with a Walkman. In (rare) moments of mechanical silence, the 'tshhh tshhh tshhh' beat that escaped the dude's ears grabbed everyone's attention, and usually upset most of them. These days, most commuters are too busy pretending to work their PDAs to notice. Thanks to JNC, you can bring back the glory days of commuter abuse. 'SSF-164' is certainly a terrific name for this product, but an we think an even better name would be 'Ear Grooving Funk-Ahoy Machine'. When equipped with said machine, sporting 64MB of 1980s Italian disco beats, one could conceivably give everyone within a ten-meter blast radius the tshhhits. For the full story read the review on page 72. Please be also kindly thanking JNC for this whack prize.

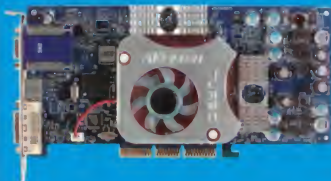
Q: Which Racey songs were top 10 hits in Australia?



Albatron Ti4200 Turbo

When Big Jack Ko left Gigabyte to found Albatron, he had a vision. To crystallize that vision, Jack named his new company Albatron, which sort of represents a great big bird (Albatron) soaring over all the little birds (every other company in the world). This makes good sense. The Atomic krew always think first of ocean birds when confronted with seemingly miraculous technical wonders. Usually we think about a krawky old seagull, but Jack's vision transcends such avian mediocrity. Big Jack thinks big. He took the word Albatross, which is already a very powerful word, and fused it with 'tron', which has always been a sure-fire way to make something ordinary something wonderful. The Albatron Ti4200 is wonderful too. It won an award in this very issue and it overclocks like a wounded seagull.

Q: Where does Albatron's Dr Pro live?



L.I.S LCD panel

Get this: the LCD panel here is from a company called L.I.S. That stands for 'Lost In Space'. They're Korean. The same people that can't even handle 100 hours of Starcraft without keeling over dead. Lightweights. There's nothing lightweight about the panel though. It'll tell you everything about your system. Totally everything. In case you suddenly get confused about which OS you're running, just glance at the panel and it'll tell you, along with less useful info like temps and fan speeds. It's even got a funky dancing graph Winamp visualtization. How neat! You even get to laugh with your friends at the funny company name! This is exactly the kind of product that you'd expect to find at PC Case Gear, being Australia's premier source of cool stuff. Thanks to those guys, one of you lucky people gets Lost In Space. Ha ha.

Q: What were the robots names in Silent Running?



No One Lives Forever 2

Cate Archer is like Austin Powers, except she's a chick, and luck has nothing to do with her success as a nazi killing machine-cum-angel of darkness. Catey Cate wears skin-hugging orange spy outfits and can drive a snow mobile and shoot a crossbow at the same time. She's everything you want to be, unless you're already a sexy secret agent. Monolith have created the game No One Lives Forever 2 so you can live that fantasy, at home on your PC. Built using the Lithtech engine, it surprisingly doesn't suck, oozing style and funky story bits. The Atomic krew even took time away from Unreal Tournament 2003 to play NOLF 2. It's that good. Feeling compelled to share the joy with you, we sleazed onto Vivendi and scabbed 6 copies that you could perhaps win if you're smart and lucky.

Q: How was Mata Hari executed and what happened to her body?



Email entries to win@atomicmpc.com.au or post them to: **Atomic**, PO Box 275, Beaconsfield NSW 2014. Please send a separate entry for each competition. Please ensure the competition name is the subject of the email, or is displayed clearly on the front of the envelope. The closing date for entries is 18 December 2002. Winners will be announced in **Atomic 25**.

Atomic 21 winners: Altec Lansing 80321 console speakers: Q. What does the PS2 slogan 'The third place' mean? A. A place of refuge and relaxation. 1st place: Home 2nd place: Work. J. Fehon, Blaxland NSW. Iwill P4GS mobo + FI panel: Q. What aromatic substance is found in the stomach and intestines of the sperm whale? A. Ambergris. When it is first removed from a whale, ambergris is a thick, black, foul-smelling liquid. Later, it hardens into a waxy aromatic substance. When heated, it produces a

pleasant earthy aroma. S.Wickramasinghe, Seven Hills NSW. Tyan Tachyon G9000: Q. What should you do if you're attacked by a Grizzly Bear? A. Roll up into a ball and lie still; or shoot it. D. Wu, email. The Sum of All Fears: Q. What form of propulsion drove Markus Ramius' vessel? A. The Red October used a magneto-hydrodynamic or 'Caterpillar' drive. G. Shingles, email; J. Manning, Gorokan NSW; D. Spencer, email; B. Carr, Macquarie Fields NSW; G. Barnier, Oxley QLD; B. Oliver, Chelmer QLD.

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posting or emailing forms to AJB Publishing Pty Ltd. 4. The draw will be held at the offices of AJB Publishing Pty Ltd at 5.00pm on 18.12.02. Winners will be notified by mail and published in **Atomic 25**. The prizes are not transferable or exchangeable. 6. The judges' decision is final and no correspondence will be entered into. 7. The promoter reserves the right to publish the winner's name and suburb for promotional purposes. 8. All entries will become the property of AJB Publishing Pty Ltd.

The Uber Linux box project Pt4

Just when you thought it was safe to logout of your box, Ashton Mills dishes out one more fun-filled installment of Linux goodness for you! This month's knowledge database includes ad-blocking for effective sanity preservation, kernel compilation for competent kernelisation and enough tools and commands to qualify you as a true geek.

So you have a server that shares file space, forwards and firewalls packets, speeds up and saves your bandwidth, logs its own netstats, serves up Linux programs to your Windows desktop, runs a SETI client to discover life on other planets, hosts a CS server for your pals, and is managed remotely from the local LAN or across the Internet using SSH and Webmin. Is there anything else we want to do? With Linux there's always plenty to play with!

Last month's tutorial concluded the core features we wanted to build with the Uber Linux box project, so this month we'll round it all off by adding a simple ad blocker to Squid (saving both bandwidth and sanity), show you how to run a full screen Linux desktop over the network, delve into the art of kernel compilation, and leave you with a starting point for Linux tools and commands so you can better explore on your own from here.

So slip on your 'got root?' T-shirt (see www.thinkgeek.com), crack open a Jolt, and get comfy.

Ad Zapper

Banner advertising is a bane of the Internet that has, sadly, become a necessary evil. While popups and popunders can be disabled by using a browser like Mozilla, banner-ads form part of the layout of many Web pages.

Sometimes they are nicely unobtrusive and even,

dare I say it, informative.

Mostly, though, they are an ugly pain in the arse. However, just because a page serves up ads doesn't mean you have to put up with viewing them (especially when you're paying for the privilege to do so with your bandwidth costs).

Enter Ad Zapper, a plugin for Squid that transparently filters out banner ads on the fly. Aside from saving your sanity, Ad Zapper provides two other key benefits: it saves you more bandwidth now that you don't need to download a hundred ads a day, and it further speeds up your browsing even though Squid is caching page elements. The ever-cycling banner

ads often have to be fetched before a page will display – by filtering out the ads, previously visited sites load almost instantly.

1: Start by grabbing Ad Zapper. SSH into your box as root, `cd` to `/tmp`, and use `wget` to fetch the file directly:

```
wget
www.zip.com.au/~cs/adzap/scripts/squid_redirect
```

2: Make it executable with `chmod a+x squid_redirect`

3: Move the file to `/usr/bin`, `mv squid_redirect /usr/bin`

4: Open up the Squid config file `/etc/squid/squid.conf` using `ged` or `kedit`.

5: Scroll down or search until you come to 'redirect_program', and after the comments add:

```
redirect_program /usr/bin/squid_redirect
```

Uber note: Just below this, you'll find another entry for 'redirect_children'. If your Uber box is serving more than a few machines, or a household of hardcore geeks, it may help to uncomment this and set it to ten or more to cater for demand. Keep in mind each instance of `squid_redirect` takes up a few megabytes of memory.

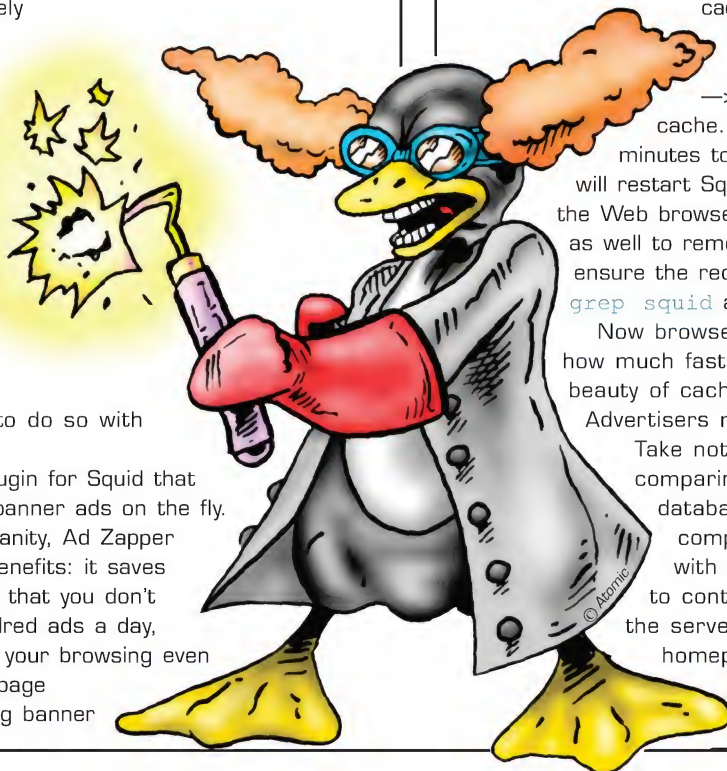
6: Save the file and then login to Webmin as root. All we need to do is restart Squid, which we can do with `squid -k reconfigure`, but we might as well clear and rebuild the cache anew. Thankfully, Webmin makes this easy.

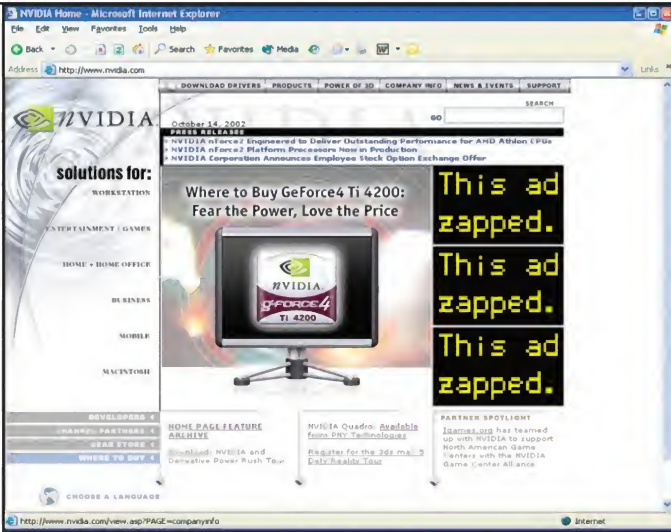
From Webmin click on Servers → Squid → Clear and Rebuild cache. Click to confirm and give it a few minutes to work. When it's done, Webmin will restart Squid automatically. Be sure to purge the Web browser cache on all your LAN machines, as well to remove any cached ad images. To ensure the redirector is running, type `ps ax | grep squid` at the command line.

Now browse all your favourite sites, noting how much faster ad-free pages load! Ah, the beauty of cached firewalled ad-filtered gateways. Advertisers may hate them, but we love 'em.

Take note that Ad Zapper works by comparing ad-sources against a known database of ad servers. It's quite comprehensive but if you find a site with ads that aren't filtered, feel free to contact the Australian author to add the servers to the list. Check the homepage at

www.zip.com.au/~cs/adzap for more detailed information.





ABOVE: No offence NVIDIA, but you load faster without the ads

Maximum X

Last month we showed you how to run applications over the network – but what about a whole desktop? There are a number of ways we can do this, including the popular cross-platform VNC (Virtual Network Computing). However X was designed to do precisely this sort of task, so let us expand on our tutorial from last month and send an entire desktop over the network to your Windows box.

If your Uber box is a humble Pentium with scarcely 32MB of RAM this section may be out of your reach. We're going to set up a full screen desktop login over the network, which means running an X server on the Uber box. In addition to all the other tasks it's doing, you're going to want at least mid-range hardware for this to be practical. In fact, if the hardware wouldn't run a Windows desktop smoothly don't expect it to do the Linux desktop justice.

XDMCP

Most distributions, including Mandrake, will start the X Display Manager (XDM) or a variation thereof (such as KDM or GDM) when the machine boots into graphical mode. This allows you to login as a user and load your personalised desktop.

Not only can you login at the machine locally through XDM, it is possible to do so remotely through the power of X.

Remote connections to an X server are handled by XDMCP, the X Display Manager Control Protocol. XDMCP restricts and authenticates remote connections to the XDM (or equivalent) server and, for permitted connections, serves up a graphical login on the remote machine – in other words, a full screen remote desktop.

1: Before beginning, make sure X runs fine on your Uber box. Even though the video horsepower of the server box won't be used, X needs to be running and it won't load if improperly configured.

If you know X runs fine, proceed to Step 2. If not, hook up a monitor to the Uber box, login, and run `startx`. If the GUI loads and displays logout, proceed to Step 2. If it doesn't you'll need to configure X for your system – simply run `xf86cfg -textmode` and select your video card and a generic monitor (as it won't actually be used).

2: Next we need to tell your Uber box to allow connections using XDMCP. Of the two login managers, GDM is somewhat nicer so we'll set that up here. GDM should already be installed as part of Gnome if you followed the installation guide in *Part 1*.

SSH into your box as root and use `gedit` or `kedit` to edit `/etc/X11/gdm/gdm.conf`. Scroll down to the section titled `[xdmcp]` and change `Enable` to 'true', then save the file.

3: In Windows drill down to the WinaXe folder (which you installed last month) and run 'Xsettings'. Under Startup select 'Full screen' and then, a little below, tick 'Use XDMCP'. Click on the Settings button and for 'Connect Host:' type in the IP of your Uber box and then click OK.

4: From your login under Linux run `gdm`. If you `ps ax | grep gdm` you should see both GDM and the X server have started.

5: And now the magic. Start WinaXe and you should be presented with a full-screen GDM login. Enter a username and password and say 'hello' to a full screen Linux desktop. Easy!

If you're using a 100Mb network and have reasonable hardware in your Uber box you won't notice that the desktop is running remotely instead of locally. X is fast, but you can speed it up further if you wish by selecting a lower colour depth in WinaXe's settings (less colour, less bits, less bandwidth) and – if you plan to take advantage of this feature remotely over the Internet – a full screen desktop or just individual programs using the `-display` switch. Read up on 'lbxproxy' ([man lbxproxy](#)) to learn about setting up compressed streams.

To switch between your Windows and Linux desktops, simply Alt-Tab as you would using any other application.

If you wanted to get tricky you could run both desktops overlapping each other by selecting 'Multiple + Remote WM' instead of 'Full screen' in Xsettings, and then drag the Windows taskbar to the top. It's fun to try, but not practical.

To have X and GDM running automatically at boot, simply edit `/etc/inittab` and replace the '3' with a '5' in the `initdefault` line:

```
id:5:initdefault:
```

Then, at the bottom of the file, replace 'prefdm' with 'gdm' as follows:

```
x:5:respawn:/usr/bin/gdm
```

If `gdm` isn't already running, you can boot into graphical mode without rebooting the machine by running: `init 5`.



ABOVE: Logging into the Uber box from Windows XP

As you can see, X is a powerful and versatile display system. Anything you can do in front of a Linux box you can do remotely over the network. However, as the Uber box project was set-up as a server box, there won't be much end-user software to play with on your remote desktop. If you install the usual Internet, Office and multimedia packages however, you could easily set-up logins for everyone in the household and each person would have their own fully functional networked desktop environment. For family members or flatmates with ageing hardware, this is an excellent way to tap into the horsepower of the server to run a full desktop operating system that their own hardware normally wouldn't support.

Alternatively, if you build an Uber hardware server box and set-up a full install of Mandrake (or any other distribution) you can use the KDE or Gnome desktop as your main Internet/Office/work desktop over the network and then simply Alt-Tab to and from Windows when you want to play games. No rebooting, no dual-boot fuss, just the best of both worlds side-by-side.

Roll your own kernel

If there is one rite of passage to becoming a Linux Guru it's the fine and gentle art of compiling your own kernel. It's not as complicated as it sounds, and it's an excellent eye-opening experience – you will learn volumes about Linux and your hardware just by browsing the configuration options. Mostly, however, you can improve the performance of your machine by creating an optimised kernel tailored for your system.

There are however a number of requirements. Firstly you need the kernel source and development tools installed as well as the space to hold them (approx 300MB – the kernel source alone is 150MB). You'll also need a good dose of patience. Chances are you will make a mistake when compiling a kernel for the first time – you might forget some vital hardware support, or compile in the wrong driver. This is all part of the learning experience, and we'll configure it so that you have your old kernel to boot into in case any problems arise.

Uber note: *If you don't feel comfortable compiling your own kernel, you can still follow the guide to browse the kernel and learn plenty in the process.*

1: First we need to install the kernel source and development tools (unless, during installation, you selected 'Development' for one of the package groups).

Login as root, insert CD1 into the drive, mount it, change to /mnt/cdrom/Mandrake/RPMS and then install [rpm -ivh] the following packages in this order: kernel-headers*, make*, libbin*, binutils*, glibc-devel* and gcc-2.96* (install them with a single RPM command if you like, separated with spaces).

Next insert CD2, mount it, change to /mnt/cdrom/Mandrake/RPMS2 and then install libncurses* and kernel-source*.

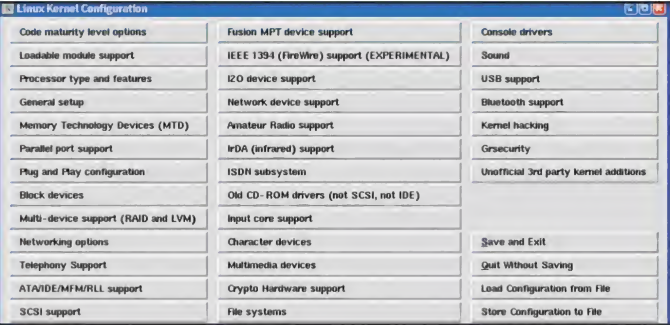
2: Change to /usr/src and type `ls -la`. You'll note a directory containing the source to Mandrake's modified 2.4.18 kernel and a symbolic link 'linux' that points to this directory. Change to this directory [`cd linux`].

3: Now for the fun. You can configure the kernel a number of ways: plain old command line [`make config`], an ASCII based menu configuration [`make menuconfig`] and X-based one [`make xconfig`]. We'll go for the X method.

Make sure WinaXe is running on your Windows box and then, on the Uber box, run:

```
export DISPLAY= [Windows box IP]:0
make xconfig
```

And you'll be presented with a graphical configuration program for the Linux kernel. Start in the top left and simply click 'Next' to progress through all the available options. It's a good idea to grab a huge caffeinated drink and set aside an hour or so to browse the feature-set of the Linux kernel. There is *a lot* in there.



The screenshot shows the 'Linux Kernel Configuration' window. It has a title bar with standard window controls. The main area is a grid of buttons for configuring the kernel. The buttons are organized into three columns. The first column includes 'Code maturity level options', 'Loadable module support', 'Processor type and features', 'General setup', 'Memory Technology Devices (MTD)', 'Parallel port support', 'Plug and Play configuration', 'Block devices', 'Multi-device support (RAID and LVM)', 'Networking options', 'Telephony Support', 'ATA/IDE/MFM/RLL support', and 'SCSI support'. The second column includes 'Fusion MPT device support', 'IEEE 1394 (FireWire) support (EXPERIMENTAL)', 'I/O device support', 'Network device support', 'Amateur Radio support', 'IrDA (infrared) support', 'ISDN subsystem', 'Old CD-ROM drivers (not SCSI, not IDE)', 'Input core support', 'Character devices', 'Multimedia devices', 'Crypto Hardware support', and 'File systems'. The third column includes 'Console drivers', 'Sound', 'USB support', 'Bluetooth support', 'Kernel hacking', 'Grsecurity', 'Unofficial 3rd party kernel additions', 'Save and Exit', 'Quit Without Saving', 'Load Configuration from File', and 'Store Configuration to File'.

ABOVE: Configuring the Linux kernel from a Windows box

For each option you can click 'Help' to find out what it does or how it works, and this is highly recommended. Don't change any options for now, just click 'Next' and browse through until you come to the end.

Now that you've achieved enlightenment, you can put it down and go back to playing with Linux or, if you know you're one hardcore tweaking mother of an Atomican, build your own kernel. It's really quite easy as stated before, but it does assume you know your PC's hardware very well. If you can't quote model names for your gear, think again about proceeding, because you'll need to know them to ensure you build a kernel that supports your hardware (but don't forget /proc is your ally).

If you want to proceed, line up some caffeinated beverages and a packet of biccies and read on.

1: Start browsing the feature set, starting with 'Code maturity level options', and this time select the options that relate to your hardware – the plan is to include what you need and exclude what you don't. If you're unsure, the golden rule is, as always, to leave it as it is.

For example, when you get to 'Processor type and features' select your CPU to optimise the kernel for your CPU architecture. For 'IDE, ATA and ATAPI devices' be sure to select the IDE chipset(s) your motherboard uses. For 'Filesystems' ensure you have Ext3 support compiled in. If you don't need PCMCIA support remove it, and so on. When you're done you'll have a lean, mean kernel designed specifically for your machine.

You'll note that every option comes in one of three flavours: (y)es, (n)o and (m)odule. Modules allow the kernel to plug-in hardware support or feature sets on the fly, loading and unloading them as needed. Most of the hardware you're using with the stock Mandrake 8.2 kernel is being supported through modules (type `lsmod` to see). As a general rule, if you know you need specific hardware support (like the driver for your network card) you might as well compile it in directly (select 'y') instead of as a module. For anything you are unsure about, or that you intend to use only occasionally (such as ISO9660 support to read CD-ROMs) you may as well compile as a



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module – this way you're not wasting memory with support features you don't use.

2: Once you've finished tailoring the kernel for your system select 'Save and exit'. Now, finally, it's time to compile it. Run the following:

```
make dep; make clean
make bzImage
```

Note the capital 'I' in 'bzImage'. If your machine is an old box, go and watch a DVD. When it's done you should find the last few lines on screen mention the total size of the system (the kernel) in kilobytes. You'll note that all the wonderful features and all your hardware drivers compile into a kernel that's less than 1MB in size. Not bad for the heart of your OS is it?

If instead there is an error, run `make xconfig` again and be sure you haven't left out some vital support.

3: Now, for those components you selected to compile as modules, we make these also:

```
make modules
```

Modules reside in `/lib/modules/[kernel version]`, and we can automatically install them to this location like so:

```
make modules_install
```

A program called `depmod` will likely spew some errors, ignore these. They are related to the fact that there are some modules already present on the system that are not referenced by your kernel configuration.

4: Finally we have to actually install the kernel. While still in the `/usr/src/linux` directory run:

```
cp arch/i386/boot/bzImage /boot
```

5: We're almost done. Now we need to add the kernel to the boot menu:

```
jed /etc/lilo.conf
```

Add a new entry at the bottom of the file for your kernel. Copy the first entry starting 'image=/boot/vmlinuz' down to 'read-only', but replace 'vmlinuz' with 'bzImage', change the 'label' to something like 'linux-new', and don't include the 'initrd' line. You should end up with something like this at the end of the file:

```
image=/boot/bzImage
label=linux-new
root=/dev/hda1
append= devfs=mount
read-only
```

Be sure the 'root' line matches the entry for the 'vmlinuz' kernel – this points to the drive where Linux is installed (see mounting under 'How do I..?' for a little more on drive naming).

Save the file and then run the Linux LOader to install the new configuration like so: `lilo`.

Congratulations! Now we come to the only time you'll ever need to reboot your Uber box. Make sure a monitor and keyboard are hooked up, `reboot` and then, at the 'boot:' prompt, press Tab to see your options or simply type in 'linux-new' or whatever name you gave your kernel to boot it. Watch in glory as your Uber kernel loads or, if you missed something vital, watch the kernel panic and barf out an error.

If your kernel boots fine login as root, check the output of your wonder kernel with `dmesg | more`. Check the version with `cat /proc/version`.

If you're happy everything works as it should, you can make your new kernel the default boot option in LILO by editing `/etc/lilo.conf`, changing the 'default=' line at the top to point to

your new kernel and then re-running `lilo`.

If, in the future, you want to take advantage of new stable release or development kernels all you need to do is download the kernel, `tar -zxvf` it from the `/usr/src` directory and then move the symlink of 'linux' to your new source directory (`rm linux; ln -s linux [new source directory]`). Then repeat the configuration/compilation process as above.

Kernel source can be found at [ftp://ftp.au.kernel.org](http://ftp.au.kernel.org), stable kernels are (currently) in the 2.4 tree, while development kernels can be found under the 2.5 tree. Generally, even numbered kernels are stable releases, odd are development.

If it's all too hard don't stress, after all you don't *need* to compile a kernel. But it is both an excellent learning experience and the ultimate in Linux tailoring, and the very essence of what *Atomic* is all about. What could be more *Atomic* than compiling your own operating system kernel? If you're determined to succeed, the best advice is to expand your Linux knowledge before proceeding – read online forums, new user guides, and search Google. It's not a matter of *if*, only *when*.

Mastering Linux

Obviously, this is a huge (and wonderful) topic, but before we leave you in this last Uber box instalment, we'll arm you with a few hints on making the most of your Linux box.

Fun with grep

There are many powerful commands at your disposal under Linux, and one of the most versatile is the all purpose text parser known as `grep`. `Grep` is an Uber-tool that can do everything but make coffee (actually it can probably make coffee too if you tried! – see `/usr/share/doc/HOWTO/HTML/en/mini/Coffee.html`).

`Grep` has many options but it essentially searches for a given string in a file or stream piped to it. The `monthylstats` script that pushes throughput values to MRTG for graphing uses `grep` to rip out the single line of information from `/proc/net/dev` that pertains to a specified network device.

`Grep` can be used to simply search a text file, as in `grep CameronDiaz little_blackbook.txt` or as a means to parse the output from another program, such as `history |grep [command]`. As we explored earlier with `ps ax | grep gdm` it's also useful to see if programs are running and to find out their process ID (handy when it comes to terminating them with `kill` or `kill -9` for stubborn processes).

We can also use it, of course, as a means to examine our firewall logs.

If you simply `tail /var/log/syslog` and look at a dropped packet you'll note 'DPT' refers to the destination port (see 'Tracking Cracking' in Part 2 for more on `iptables` output). We can, therefore, examine attempts on a given port by pulling out all lines referring to a specific service, such as FTP, as follows:

```
grep DPT=21 /var/log/syslog
```

We can then `nslookup` or `traceroute` any of the SRC IP addresses to see where these attempts are coming from. You can browse `/etc/services` to see which services run on which ports, or if you see a port you don't recognise you can (you guessed it!) simply `grep [number] /etc/services` to see if it's a known service.

Just out of interest, let's also use `grep` to count the

number of instances of a matched search – in other words, how many attempts to connect to port 21 have been made:

```
grep DPT=21 /var/log/syslog -c
```

The '-c' switch tells grep to report the number of matching lines. On our Uber box over a one-week period (note Mandrake compresses and rotates the logs weekly), searching syslog for common services revealed the following: 228 attempts to connect to FTP (port 21), 43 attempts on Telnet (23), 59 to SSH (22), and – the real kicker – 3181 attempts on port 137, the NetBIOS name service Windows uses to establish a Windows file sharing connection. Aren't you glad your Windows box isn't directly connected to the Net?

How do I . . ?

Manage files: One of the easiest and fully-featured file managers under Linux is the humble console-based Midnight Commander. Reminiscent of the classic XTreeGold, MC can view inside tar.gz and RPM archives, modify permissions, edit files, perform comprehensive searches, view HTML as formatted text, and connect directly to network and FTP links. MC is gold! To install mount CD1 of Mandrake, `rpm -ivh /mnt/cdrom/Mandrake/RPMS/mc*`.



ABOVE: The Uber file manager Midnight Commander

Monitor free space: The `df` (disk-free) command will show you space usage across all mounted filesystems. Use with '-h' for human readable (ie. megs and gigs over bytes) format. Use the `du` (disk usage) command to monitor space occupied by directories and files. Use `du -h -x - --max-depth=1` to tally just the total space used by each directory.

Find files: MC has an easy to use search function, but you can also take advantage of the following: `whereis` and `find`. To do an exhaustive search ignoring mounted filesystems (so you don't search network drives etc) use: `find / -mount -name [expression]`.

Get help: There's an extensive list of How-To guides, written by users just like you for users just like you, already installed on your system. Head on over to `/usr/share/doc/HOWTO/HTML/en` and launch Mozilla with `index.html` to browse the them. Don't forget about `man` files as well for any given command. For the larger `man` files use '/' and type in a search to find content within the file, entering '/' to repeat the search as necessary.

Master mount: The mount command does much more than mount CD-ROMs. If you have other partitions on a machine, such as NTFS or FAT32 Windows partitions, you can mount them as well. First make a directory you'd like to mount at, such as `mkdir /mnt/windows`, and then mount as follows:

```
mount -t [filesystem] [device]
/mnt/[directory]
```

Filesystem can include 'vfat' for FAT/FAT32, 'ntfs' for NTFS, and so on. Devices are – as covered in Part 1 – found under the `/dev` directory. Hard drives and partitions are numbered sequentially, with IDE drives starting with 'hd' and SCSI drives 'sd'. The first partition on the first IDE drive is `/dev/hda1`, the third partition on the second hard drive is `/dev/hdb3` and so on.

Aside from CD-ROMs and hard drives, you can also directly mount network shares to your filesystem. So, for example, plonk a CD into the CD-ROM in your Windows box, share the CD-ROM, and then mount it directly over the network from the Linux box like so: `mount -t smbfs // [Windows IP] / [share name] /mnt/cdrom`.

And if you have ISO images you'd like to access there's no need to go burning a CD – you can mount them directly by taking advantage of the loopback device: `mount -t iso9660 [ISO file] /mnt/cdrom -o loop`.

Master RPM: You know how to install software, but what else can you do with RPM? The '-e' switch will erase (remove) a package, the '-U' switch can be used to upgrade a package already installed, and the '-q' switch can be used to query installed packages – for example `rpm -qil [package]`. `more` will list package details and files provided by a package. For the full rundown, `man rpm`.

Master /etc: As mentioned in Part 1, all configuration files are stored under `/etc`. But what exactly will you find in there?

The `/etc/fstab` file lists filesystems mounted automatically at boot, `/etc/resolv.conf` contains DNS addresses, `/etc/hosts` file can be edited to contain name mappings for IP addresses (so you can do things like 'telnet Gigantor' instead of 'telnet 192.168.1.25'), the `/etc/rc.local` file is similar to the 'Startup' directory under Windows (place any programs you want to run after bootup here) and the `/etc/sysconfig` tree contains all the files and scripts Mandrake uses to configure various aspects of the system, including networking settings. Explore it to find a lot of useful configuration files.

Learning more

These last four tutorials have covered some fun topics dealing with the versatility and power of Linux. For the most part, you've been learning as you go, discovering Linux through the implementation of features and services that we've covered. As Atomicians, you have a knack for the technical, however you no doubt have many questions about Linux and how it works. We could write volumes about this, but then you'd have to wait a month to learn something new!

As always, the best places to quench your thirst for knowledge are online. Check out the following links, as they are good starting points for your ultimate journey into Linux gurdorn.

Learning Linux links: Linux.com www.linux.com, Linuxnewbie.org www.linuxnewbie.org, The Linux Documentation Project www.tldp.org, Fresh Meat www.freshmeat.net, Google's Linux www.google.com/linux

Special edition

'I'd like to buy *The Fellowship of the Ring* on DVD,' I said to the young guy chewing gum behind the counter. 'Sure,' he said. 'The *Deluxe Widescreen Edition*?'

'Okay,' I said. Anything *deluxe* must be good – first rule of fast food.

'Or the *Extended Super Edition*?'

My hand hesitated over my wallet.

Extended? *Extended* is always better – first rule of cosmetic surgery. 'I'll take the *Extended* version,' I decided, rummaging for more cash.

'There's also a *Limited Edition Extended Deluxe Edition*,' he said casually. *Limited Edition*. The holy grail of DVD releases, and a whole lot better than the mass-market, common place *Extended* and *Deluxe* versions. And, of course, a bucket-load more cash.

A little ignorant, I asked the obvious: 'What's in the *Limited Edition*?' The guy behind the counter stopped pressing buttons on the checkout screen and raised his eyes. I swear, if King Kong had come barging through the store swinging his deluxe extended arms, this guy wouldn't have blinked. He looked at me as though my head was on backwards. 'It's the *Extended Edition*, plus another disc of extras, plus two bookends.'

'Oh,' I nodded. Bookends. The ultimate in limited edition paraphernalia (almost as good as a Wonka golden ticket or an *Atomic MPC* sticker). My knees went a little weak. 'Is it . . . umm . . . expensive?' I asked. 'Stupid stupid,' I

thought – too late. The guy sighed and shook his head. Obviously, no amount of cash carried by a regular wage earner could buy one of these. He swallowed his gum with distaste and reached out to snatch the credit card from my open wallet. From that point on the transaction became one big blur, as half my mind decided how to tell 'she who holds the purse strings', and the other half wanted to assume foetal position in the anime corner.

I hate buying DVDs. Frankly, the whole 'multi-version' thing is driving me nuts. I got fed up waiting for the widescreen version of *Harry Potter*, so I bought the pan-and-scan disc (I just love those black vertical bars on my widescreen TV – not). Then six months later they announce the widescreen version will be out for Christmas. Now I have to decide if wide Harry is worth another forty bucks, or if I should keep skinny Harry. It's like deciding if the blonde girl you're chatting up is worth another round of drinks, or if you should move on to her friend instead (oh dear, I can see the hate mail now).

Atomicans regularly go through the same process with computer hardware. Each week new hardware's released, and each week we kick ourselves for not waiting just a little bit longer. I have to admit, all the way through *issue 21*'s review of the RADEON 9700 I was booting my metaphorical arse for buying a GeForce4 Ti. 'Fastest video card ever,' (kick). 'Takes IQ gaming to a new level,' (kick).

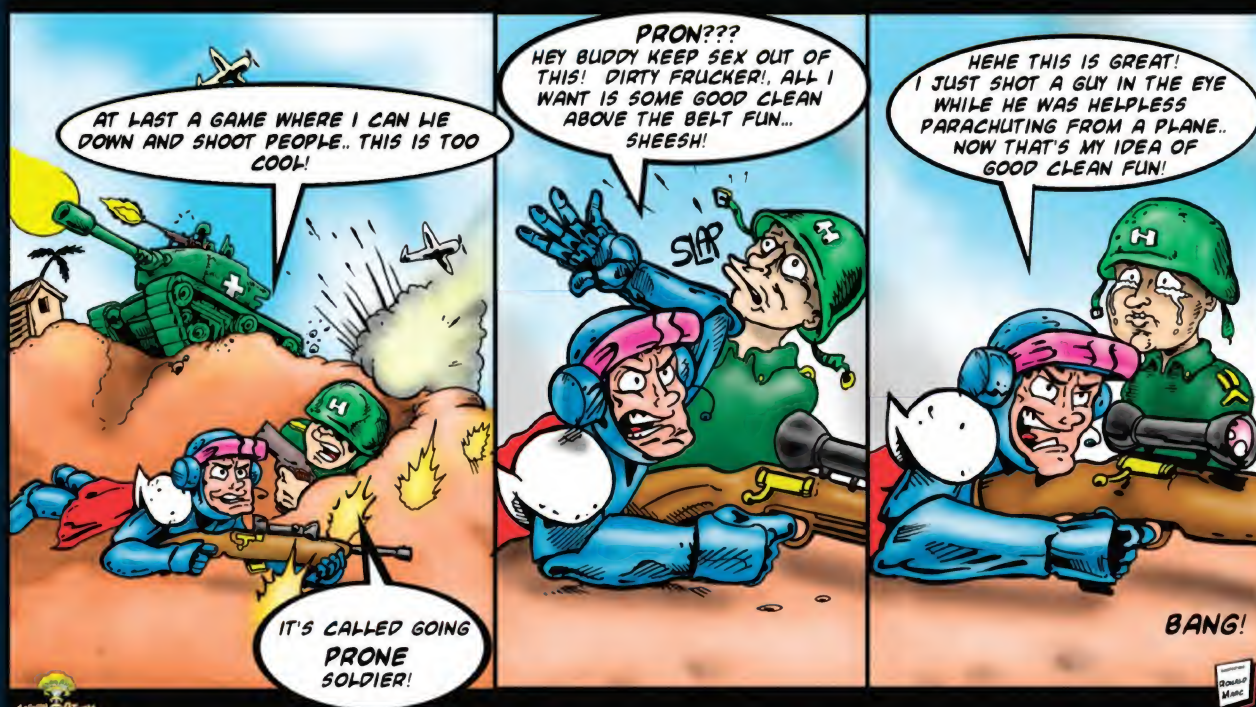
'300% better than GF4,' (kick). Building an uber box and maintaining your sanity is a difficult thing. The depressing truth is that we'll never get on top of the technological swell. Even if I line up every morning at nine o'clock at Charlie's PC Barn with as much money as my arms can carry, I'll never have the ultimate PC. There's always some lab technician somewhere in the world waiting to pull a trump card and douse my pride.

Should I give up? You (and the hardware dealers) will be pleased to hear that the answer's 'No'. There'll always be a need for massive amounts of computing power, as new games and software are developed with requirements greater than a moon landing. Soon Photoshop will ship with a warning: 'Running this program with less than eight gigabytes of RAM will crash everything – cars, planes, pacemakers. 3ds max will start up and the power grid will dim. Neverwinter Nights 2 will require one whole processor per character, and two if they have to move.'

It will probably never end, and it's not worth worrying about until your mate shows you his new Itanium (isn't there something in the Bible about coveting your neighbour's Willamette?). Meanwhile, I'm going back to my new DVD.

Last thing I saw, the hobbits had opened a Subway and were making Frodo footlongs. Ah, yes. I just love extra footage.

John Simpson



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